1888

Iowa State Agricultural College

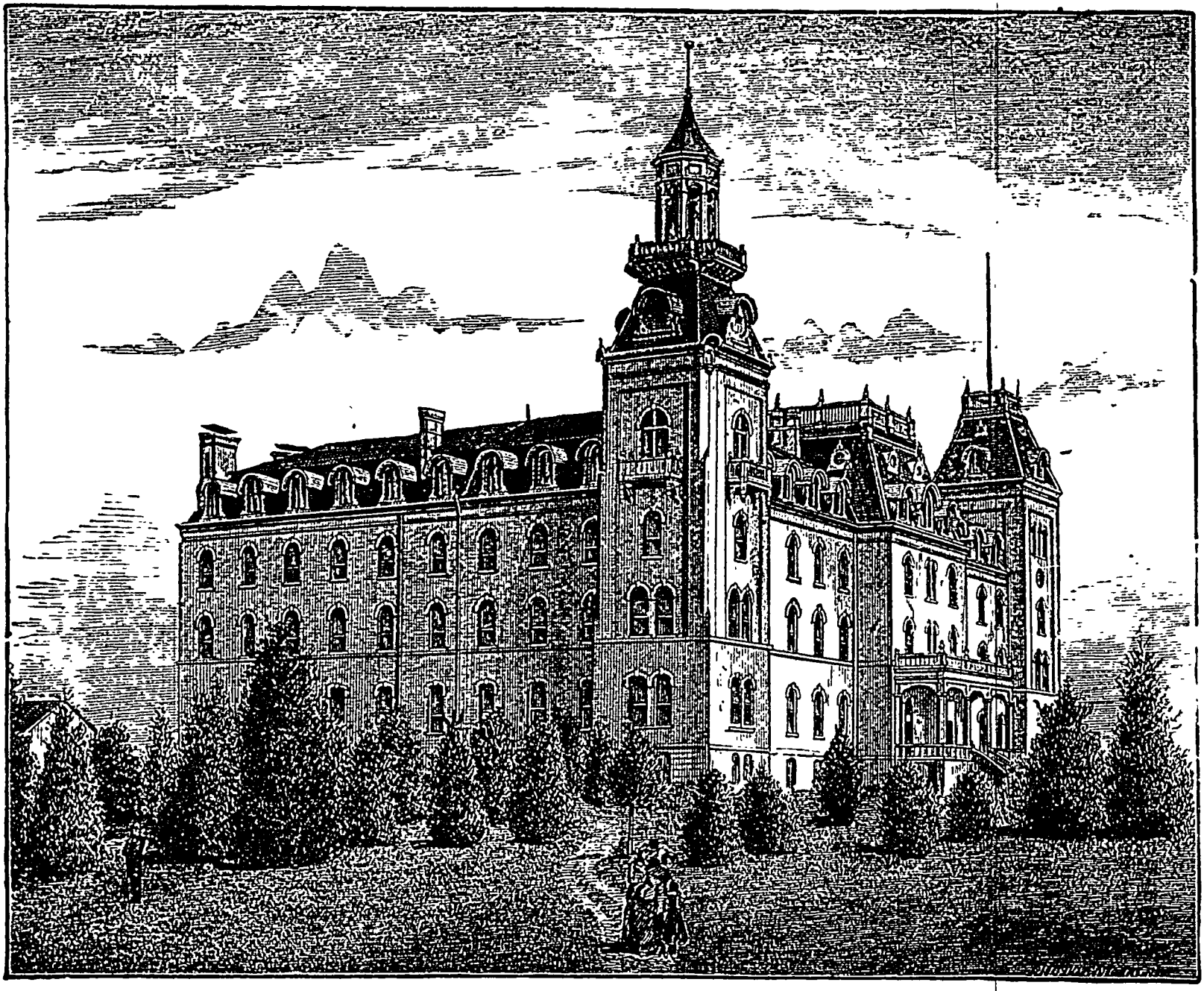
Iowa State University

IOWA

STATE AGRICULTURAL COLLEGE.

in both sets

1888.



IOWA AGRICULUURAL COLLEGE—MAIN COLLEGE BUILDING.

IOWA STATE COLLEGE

OF

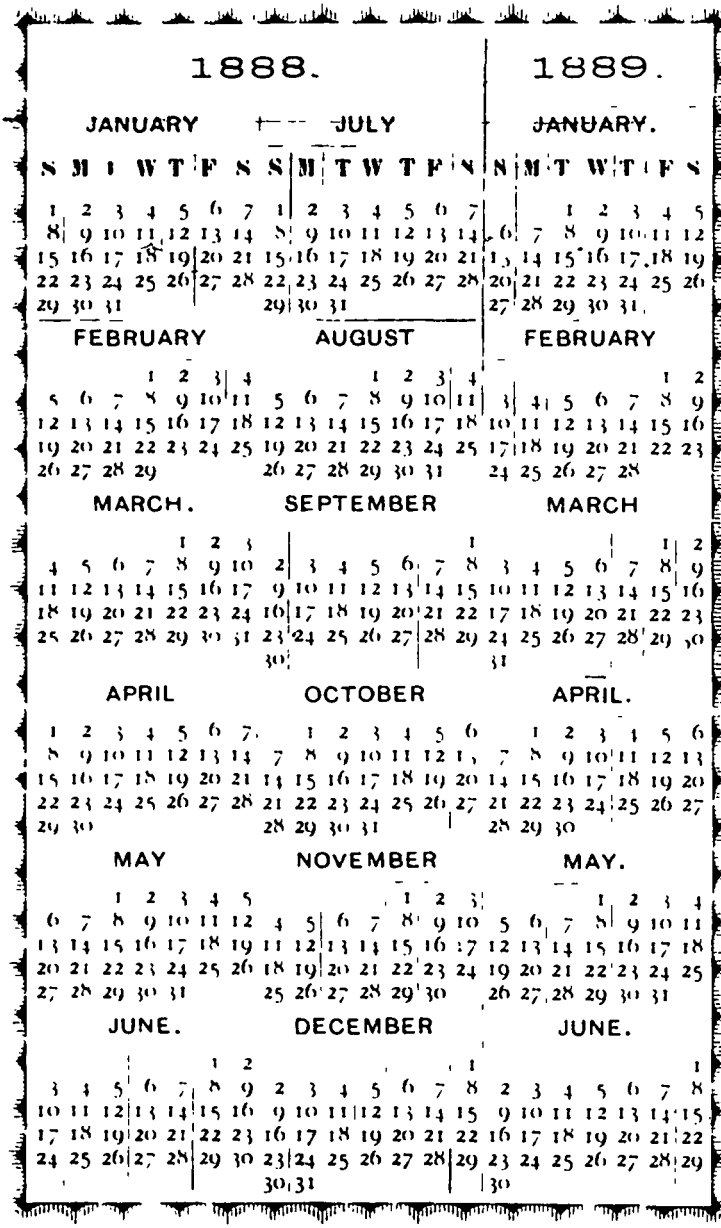
AGRICULTURE AND MECHANIC ARTS.

CATALOGUE,

1888.

"SCIENCE WITH PRACTICE."

1888.
BY THE COLLEGE.
AMES.



CEDAR RAPIDS IOWA
DAILY REPUBLICAN PRINTING HOUSE
1888

CALENDAR FOR 1888.

Term opened	Wednesday, February 29.
Entrance Examinations	Wednesday, February 29. Thursday, March 1.
Recitations began	Friday, March 2.
Term Examinations	June 14 to 20.
Junior Exhibition	Wednesday, June 20.
Second term begins	Wednesday, July 18.
Entrance Examinations	Wednesday, July 18. Thursday, July 19.
Recitations begin	Friday, July 20.
Term Examinations	November, 7 to 14.
Baccalaureate Sermon	Sunday, Nov. 11.
Address before Trustees	Tuesday evening, Nov. 31.
Commencement Exercises	Wednesday, November 14.

Winter vacation from Nov. 15, 1888, to February 27, 1889.

First Term of 1889 opens	Wednesday, February 27.
Entrance Examinations	Wednesday, February 27. Thursday, February 28.
Recitations begin	Friday, March 1.
Term Examinations	June 13 to 19.
Junior Exhibition	Wednesday, June 19.
Second term of 1889 begins	Wednesday, July 17.

BOARD OF TRUSTEES.

	Term Expires.
First District—Hon. J. W. Garner, Columbus City,	1892
Second District—Hon. C. M. Dunbar, Maquoketa,	1892
Third District—Hon. G. W. Dunham, Manchester,	1890
Fourth District—Hon. S. P. Yeomans, Charles City,	1892
Fifth District—Hon. Joseph Dysart, Dysart,	1894
Sixth District—Hon. John Morrison, Hedrick,	1890
Seventh District—Hon. J. S. Clarkson, Des Moines,	1894
Eighth District—Hon. Geo. B. VanHouten, Lenox,	1892
Ninth District—Hon. Platt Wicks, Harlan,	1890
Tenth District—Hon. Eugene Secor, Forest City	1894
Eleventh District—Hon C. D. Boardman, Odebolt,	1894

OFFICERS OF THE BOARD.

Hon. Joseph Dysart, Dysart,	*Chairman.*
E. W. Stanton, Ames,	*Secretary.*
Herman Knapp, Ames,	*Treasurer.*
J. R. Lincoln, Ames,	*Steward.*

MEETINGS.

The annual meeting of the Board of Trustees is held on the second Wednesday of November; also a second meeting in May, and others if occasion requires.

STANDING COMMITTEES OF THE BOARD OF TRUSTEES.

Executive and Finance Committee—Trustees Wicks, Yeomans, Dunham, Secor and Van Houten.

Committee on Faculty and Courses of Study Trustees Clarkson, Morrison, Dunbar, Garner and Dysart.

Committee on Farm and Farm Buildings—Trustees Secor, Boardman and Dunbar.

Committee on Horticulture, Experiments and Hybridizing—Trustees Van Houten, Yeomans and Boardman.

Committee on Workshop—Trustees Dunbar Clarkson and Dunham.

Committee on College Lands- Trustees Morrison, Boardman and Secor.

Building Committee—Trustees Garner, Dunham and Van Houten,

Committee on Investments- Trustees Yeomans, Dunham and Secor.

Committee on Library—Trustees Clarkson, Van Houten and Dysart.

Committee on Rules—Trustees Dunbar, Morrison and Secor.

Committee on Bonds—Trustees Dunham and Wicks.

Committee on Domestic Economy—Trustees Boardman, Yeomans and Morrison.

Committee on Experiment Station—Trustees Garner, Dunbar and Dysart.

Committee on Scientific Departments—Trustees Clarkson, Yeomans and Boardman.

OFFICERS OF INSTRUCTION.

W. I. CHAMBERLAIN, LL. D. PRESIDENT,
Professor of Ethics and Civics, and Lecturer on Practical Agriculture

A. S. WELCH, LL. D.,
Professor of Psychology and History of Civilization

M. STALKER, M. Sc., V. S.,
Professor of Veterinary Science

J. L. BUDD, M. H.,
Professor of Horticulture

E. W. STANTON, M. Sc.,
Professor of Mathematics and Political Economy

D. S. FAIRCHILD, M. D.
Professor of Pathology, Histology, Therapeutics and Comparative Anatomy.

C. F. MOUNT, C. E.
Professor of Civil Engineering

JAMES RUSH LINCOLN, CAPT. 1st REGT. I. N. G.,
Professor of Military Science and Tactics.

BYRON D. HALSTED, Sc. D.,
Professor of Botany

*NORMAN C. BASSETT, B. Sc.,
Professor of Mechanical Engineering and Drawing

ALFRED A. BENNETT, M. Sc.,
Professor of Chemistry

*Resigned May 1st, 1888 Successor to be appointed by the opening of the Fall Term

HERBERT OSBORN, M. Sc.,
Professor of Zoology and Entomology

J. C. HAINER, B. Sc., M. D.,
Professor of Physics

REV. A. C. BARROWS, A. M.,
Professor of English Literature, History and Latin

LOREN P. SMITH, M. Sc.,
Professor of Agriculture and Farm Superintendent

MISS LILLIE M. GUNN,
Preceptress, and Professor of French and German.

MRS. IDA M. RILEY,
Librarian, and Instructor in Elocution

MRS. ELIZA OWENS,
Instructor in Domestic Economy

MISS EVA T. PIKE,
Organist, and Instructor in Vocal and Instrumental Music.

*F. S. SCHOENLEBER, M. S. A.,
Foreman of the College Farm and of Farm Experiments

A. J. WIECHARDT, M. E.,
Foreman and Instructor in Machine Shops

E. J. CHRISTIE, B. Sc.,
Assistant in Chemistry

JOHN TILLIE, D. V. M.,
House Surgeon in Veterinary Department

E. A. KIRKPATRICK, B. Sc.,
Asstsiant in English Composition, Rhetoric and Mathematics

NON-RESIDENT LECTURERS.

LOUIS SCHOOLER, M. D.
Surgical Therapeutics

*Until May 1, 1888.

F. E. CRUTTENDEN, M. D.
Opthalmology

W. B. NILES, D. V. M.
Surgery

OFFICERS OF THE EXPERIMENT STATION.

Captain R. P. Speer,	*Director.*
G. E. Patrick, M. Sc.,	*Chemist.*
A. A. Crozier, M. Sc.,	*Botanist.*
C. P. Gillette, B. Sc.,	*Entomologist.*
J. L. Budd, M. H.,	*Horticulturist.*
L. P. Smith, M. Sc.,	*Agriculturist.*
M. Stalker, M. Sc., V. S.,	*Veterinarian.*
B. D. Halsted, D. Sc.,	*Consulting Botanist.*
A. A. Bennett, M. Sc.,	*Consulting Chemist.*
John Craig,	*Director's Assistant.*

List of Students, 1888.

RESIDENT GRADUATES.

NAME.	DEGREE.	POST OFFICE.	COUNTY.
Christie, Elza J.,	B. Sc., M. Sc.,	Ames,	Story.
Harpel, Llewellyn V.,	B. Sc. M. Ph.,	Sheldahl,	Polk.
Kirkpatrick, Edwin A.	B.Sc., M. Ph.,	Des Moines,	Polk.
Malley, Frederick W.,	B. Sc., M. Sc.,	Des Moines,	Polk.

—Total 4.

SENIORS.

NAME.	COURSE.	POST OFFICE.	COUNTY.
Abraham, John G.,	*Ag.,	Mt. Pleasant,	Henry.
Allen, J. Boyd,	G.,	Council Bluffs,	Pottawattmie
Baker, Clarence,	C. E.,	Des Moines,	Polk.
Bartholomew, Ethel,	L.,	Chariton,	Lucas.
Bartholomew, Charlie L.,	G.,	Chariton,	Lucas.
Bradford, Scott,	G.,	Ames,	Story.
Brandvig, Anfin.	G.,	Story City,	Story.
Dobbin, Fred L.,	G.,	State Center,	Marshall.
Finnigan, Charles A.,	C. E.,	Montezuma,	Poweshiek.
Flora, Grant,	C. E.,	Rhodes,	Marshall.
Gladson, William N.,	M. E.,	Corning,	Adams.
Graham, Andrew L.,	M. E.,	Atlantic,	Cass.
Granger, Karl H.,	G.,	Ames,	Story.
Gyde, James E.,	G.,	Olin,	Jones.
Henderson, Ella L.,	L.,	Monticello,	Jones.
Hunt, Charles W.,	G.,	Logan,	Harrison.

*See Abbreviations, page 19

Lightner, Fred L.,	Ag.,	Chester Center,	Powesheik.
McCuskey, Lizzie,	L.,	Defiance,	Shelby,
Meissner, George L.	G.,	Webster City,	Hamilton.
Moulton, Laura R ,	L.,	Shenandoah,	Page.
Sheafe, Edward A,,	G.,	Highland Cent'r,	Wapello.
Shelden, Bernice J.,	G.,	Ames,	Story.
Skinner, Elbert, B.,	G.,	Orchard,	Mitchell.
Spencer, Nathaniel,	G.,	Alden,	Hardin.
Tallman, Clarence E.,	G.,	Keota,	Keokuk.
Thompson, Will L.,	G.,	Madrid,	Polk.
Tilden, Lucian C.,	G.,	Ames,	Story.
Warwick, William E.,	M. E.,	Holt,	Taylor.
Waugh, Nannie E.,	L.,	Manchester,	Delaware.
Wetherby, Florence E.,	L.,	Defiance,	Shelby.
Wentch, Julia A.,	L.,	Traer,	Tama.
Wright, Will H.,	G.,	Ames,	Story.
Yates, Sherman,	G.,	Tipton,	Cedar.

—Seniors 33.

VETERINARY

Ainsworth, Fred, W.,		Brush Creek,	Fayette.
Buffington, George L.,		Salem,	Henry.
Paine, Emerson K.,		Bondurant,	Polk.
Sayers, Roscoe C.,		Algona,	Kossuth.
Schoenleber, Frank S.,	M. S. A.,	Ames,	Story.

—Senior Veterinary Students, 5.

JUNIORS.

NAME.	COURSE.	POST OFFICE.	COUNTY.
Baker, James A.,	G.,	Rhodes,	Marshall.
Banister, Nettie,	L.,	Cherokee,	Cherokee.
Banks, J. Edwin,	C. E.,	Knoxville,	Marion.
Beyer, Samuel W.,	G.,	Manly,	Worth.

Bisbee, Derward B.,	G.,	Ames,	Story.
Budrow, William B.,	G.,	Ogden,	Boone.
Chamberlain, Herbert W.,	G.,	Ames,	Story.
Cooley, Frank H.,	C. E.,	Truro,	Madison.
Culver, John M.,	M. E.,	Glidden,	Carroll.
Day, Harry B.,	M. E.,	Des Moines,	Polk.
Durkee, Joseph E.,	G.,	Floyd,	Floyd.
Gossard, Harry A.,	G.,	Ames,	Story.
Green, Burtis T.,	G.,	Little Rock,	Lyon.
Hensen, William R.,	G.,	Denison,	Crawford.
Hulse, L. Elmer,	G.,	Keota,	Keokuk.
Johnson, Nellie,	L.,	Alton,	Sioux.
Kelsey, James A.,	Ag.,	Dunlap,	Harrison.
Kerr, Thomas S.,	G.,	Cincinnati,	Appanoose.
Kimball, Clement F.,	M. E.,	Anamosa,	Jones.
Lamborn, Charles W.,	C. E.,	Elliott,	Montgomery
McClelland, Albert,	Ag.,	East Des Moines,	Polk.
McClure, Gertrude,	L.,	Knoxville,	Marion.
McLaughlin, Angus A.,	G.,	Webster City,	Hamilton.
McPherson, Albert,	G.,	Oelwein,	Fayette.
Morris, Seward,	Ag.,	Brooks,	Adams.
Newell, Belle,	L.,	Woodward,	Dallas.
Nichols, Ira A.,	G.,	Glidden,	Carroll.
Phillips, J. Frank,	M. E.,	Des Moines,	Polk.
Rickard, William U.,	C. E.,	Humboldt,	Humboldt.
Rolfs, P. Henry,	G.,	LaClaire,	Scott.
Schoenleber, John,	M. E.,	Grant,	Montgomery.
Scott, William U.,	G.,	Slater,	Story.
Scott, Ellen,	L.,	Dow City,	Crawford.
Sheldon, John A.,	G.,	Abingdon,	Jefferson.
Shoemaker, William,	G.,	Muscatine,	Muscatine.
Starr, Palmer W.,	C. E.,	Carson,	Pottawattamie.
Stearns, Charles H.,	G.,	Ames,	Story.
Stroud, John S.,	G.,	Linden,	Dallas.
Thompson, Lettie C.,	L.,	Agency,	Wapello.
Thornburg, Matthew W.,	G.,	Panora,	Guthrie.
Thurliman, Rosalie, L.,	L.,	Ames,	Story.
Wade, Charles M.,	G.,	Stanwood,	Cedar.
Wade, Elizabeth E.,	L.,	Stanwood,	Cedar.
Zimbelman, Mary C.,	L.,	Boone,	Boone.

—Juniors 44.

VETERINARY.

Ashworth, Charles A.,	Ashawa,	Polk.
Bosquet, Abram E.,	Pella,	Marion.
Geddes, T. Alexander,	Ames,	Story.
McBirney, John,	Conrad,	Grundy.
Paxton, Spencer B.,	Columbus City,	Louisa.
Platt, John H.,	Montezuma,	Poweshiek.
Simcoke, Joseph O.,	Stuart,	Adair.

—Junior Veterinary 7.

SOPHOMORES.

NAME.	COURSE.	POST OFFICE.	COUNTY.
Adams, George W.,	G. & Ag.,	Chapin,	Franklin.
Bolles, William E.,	C. E.,	Ridgeway,	Winneshiek.
Bond, George P.,	G. & Ag.,	Lehigh,	Webster.
Bramhall, John A.,	M. E.,	Carlisle,	Warren.
Buell, Hardy O.,	M. E.,	Algona,	Kossuth.
Carter, Donald M.,	M. E.,	Orange City,	Sioux.
Chamberlain, Joseph S.,	G. & Ag.,	Ames,	Story.
Cowan, Thomas J.,	G. & Ag.,	Newton,	Jasper.
Crosby, Herbert E.,	G. & Ag.,	Floyd,	Floyd.
Cowgill, Charles,	M. E.,	Ames,	Story.
Davidson, Frank E.	C. E.,	Batavia.	Jefferson.
Davidson, Charles D.,	M. E.,	Monticello,	Jones.
Dean, Nellie E.,	L.,	Des Moines,	Polk.
Dewell, William C.	G & Ag.,	Magnolia,	Harrison
Dyer, Robert M.,	M. E.,	Pleasant Val.,	Scott.
Eaton, Edward N.,	G. & Ag.,	Keota,	Keokuk.
Elden, Hattie J.,	L.,	Jefferson,	Greene.
Eustis, George D.,	M. E.,	Aplington,	Butler.
Farwell, Zelma,	L.,	Monticello,	Jones.
Georgen, John,	G. & Ag.,	Rockville,	Delaware.
Graham, J. Melville,	G. & Ag.,	Audubon,	Audubon.
Hardy, May,	L.,	Ames,	Story.

Haven, Spencer,	G. & Ag.,	Charles City,	Floyd
Henely, Eugene,	G. & Ag.,	Monticello,	Jones.
Hitchcock, Howard,	G. & Ag.,	Waterloo,	Blackhawk.
Hodson, R. Frederick,	C. E.,	Salem,	Henry.
Holmes, Harold,	G. & Ag.,	Magnolia,	Harrison.
Howard, T. Sigel,	G. & Ag.,	Des Moines,	Polk.
Howell, Sylvester S.,	M. E.,	Iowa City,	Johnson.
Inglis, Norman A.,	C. E.,	Hampton,	Franklin.
Johnson, Nellie,	L.,	Alton,	Sioux.
Kennedy, Nellie C.,	L.,	Winfield,	Henry.
Kepner, Helen,	L.,	Lenox,	Taylor.
Kreger, Edward A.,	G. & Ag ,	Keota,	Keokuk.
Maclean, David,	M. E.,	Columbus City,	Louisa.
Mann, Alice,	G. & Ag.,	Algona,	Kossuth.
Mann, Bertha,	G. & Ag.,	Algona,	Kossuth.
McCusky, Henry B.,	G. & Ag.,	Manteno,	Shelby.
McNett, Frank J.,	G. & Ag.,	Des Moines,	Polk.
Mills, Ada	L.,	Jefferson,	Greene.
Nichols, Henry H.,	G. & Ag ,	State Center,	Marshall.
Olmsted, Robert W.,	G. & Ag.,	Milan,	*Illinois.*
Perry, Joseph M.,	M. E.,	Jefferson,	Greene.
*Peshak, Albin L.,	M. E.,	St. Ansgar,	Mitchell.
Quint, Violet U.,	L.,	Carroll,	Carroll.
Rapp, Vermell,	G. & Ag.,	Ames,	Story.
Richard, Joseph H.,	G. & Ag.,	Jewell,	Hamilton
Roberts, Minnie,	L.,	Dunlap,	Harrison.
Schulte, George Henry,	G. & Ag.,	Clayton,	Clayton.
Scott, William U.,	G. & Ag.,	Slater,	Story.
Shaul, William H.,	G. & Ag.,	Millersburg,	Iowa.
Sirrine, F. Atwood,	G. & Ag.,	Dysart,	Tama.
Skinner, George C.,	C. E.,	Cedar Rapids,	Linn.
Smith, C. Tenney,	M. E.,	Ames,	Story.
Stevens, Kate,	L.,	Mason City,	Cerro Gordo.
Stinson, John T.,	G. & Ag.,	Red Oak,	Montgomery.
Thurliman, Edward,	G. & Ag.,	Ames,	Story.
Thurliman, Leo.,	G. & Ag.,	Ames,	Story.
Van Zandt, William H.,	G. & Ag.,	Madrid,	Boone.
Waters, Ida M.,	L.,	Marshalltown,	Marshall.
Yeisley, Matie,	C. E.,	Woodbine,	Harrison.

—Total 61.

*Deceased

FRESHMEN.

Adams, John Q.,	G. & Ag.,	Chapin,	Franklin.
†Angus, George S.,	G. & Ag.,	Burt,	Kossuth.
†Ashford, George,	G. & Ag.,	Nevada,	Story.
†Austin, William H.	G. & Ag.,	Milford,	Dickinson.
Ballreich, Charles A.,	G. & Ag.,	Des Moines,	Polk.
Barrows, Sarah T.,	L.,	Ames,	Story.
Bigelow, Margaret M.,	L.,	Ames,	Story.
†Bolks, George J.,	G. & Ag.,	Orange City,	Sioux.
Bowne, Frank J.,	C. E.,	Sheldon,	O'Brien.
Boyer, Howard J.,	L. & Ag.,	Red Oak,	Montgomery.
†Bradley, Edward,	G. & Ag.,	Maquoketa,	Jackson.
Bradrick, M. Lydia,	L.,	Chariton,	Lucas.
Brooks, George S.,	G. & Ag.,	Hedrick,	Keokuk.
Brown, Abbie,	L.,	Polk City,	Polk.
†Brown, George W.,	G. & Ag.,	Boone,	Boone.
†Callahan, Bernard J.,	G. & Ag.,	Dakota,	Humboldt.
Christy, George L.,	C. E.,	Des Moines,	Polk.
Clarke, Clinton C.,	G. & Ag.,	Potter,	Tama.
Cole, Myron C.,	G. & Ag.,	Osage,	Mitchell.
Colton, Fred M.,	G. & Ag.,	Columbus C'y,	Louisa.
Cook, Ada V.,	L.,	Ames,	Story.
Coons, C. L.,	G. & Ag.,	Macedonia,	Pottaw'tamie
†Cooper, George,	G. & Ag.,	Maquoketa,	Jackson.
Cottrell, Carrie L.,	L.,	Woodward,	Dallas.
Cottrell, May,	L.,	Woodward,	Dallas.
Dean, Harry A.,	C. E.,	Arcadia,	Carroll.
†Dickey, Bertram S.,	G. & Ag.,	Maxwell,	Story.
†De Cou, Frank H.,	G. & Ag.,	Woodbine,	Harrison.
Elliott, George W.,	G. & Ag.,	Berwick,	Polk.
Elwood, Charles O.,	G. & Ag.,	Colo,	Story.
†Emerson, Loyd L.,	G. & Ag.,	Stratford,	Hamilton.
Fairchild, David S.,	G.,	Ames,	Story.
Finn, Charles F.,	M. E.,	Radcliffe,	Hardin.
Gilchrist, Annie L.,	L.,	Dunlap,	Harrison.
†Greenwood, Frank J.,	G. & Ag.,	Stratford,	Hamilton.
Grove, Arabelle,	L.,	Gilbert,	Story.
Harvey, George H.,	C. E.,	Logan,	Harrison.
Hinds, Rollin E.,	C. E.,	Ottumwa,	Wapello.
Holmes, S. Robert,	G. & Ag.,	Magnolia,	Harrison.
Howe, Frank D.,	M. E.,	Ames,	Story.

Hoxie, George L.,	M. E.,	Anamosa,	Jones.
Hudson, Edwin P.,	G. & Ag.,	Sheffield,	Franklin.
Hutton, Thomas B.,	G. & Ag.,	Des Moines,	Polk.
Jaquiss, Daisy,	L.,	Cincinnati,	Appanoose.
Jesme, Lena,	L.,	MissouriValley,	Harrison.
Johnson, Charles W.,	G. & Ag ,	Ontario,	Story.
Jones, Walter Clyde,	M. E.,	Keokuk,	Lee.
†Jones, Edwin D.,	C. E.,	Sharpsburg,	Taylor.
†Jones, William B.,	G. & Ag.,	Sharpsburg,	Taylor.
Jongewaard, Cornelius A.,	G. & Ag.,	Orange City,	Sioux.
King, Edwin S.,	G. & Ag.,	Fifteen Mile.	Tama.
King, Nellie,	L.,	Fifteen Mile,	Tama.
Lonsdale, Britta B.,	L.,	Dale,	Guthrie.
Lovejoy, Alva B.,	G. & Ag.,	Rock Creek,	Mitchell.
†Lorbeer, Lewis A.,		Humboldt	Humboldt.
McCall, Roselle T.,	G. & Ag.,	Moingona.	Boone.
McNaughton, Louis D.,	M. E.,	Charles City,	Floyd.
Meek, William H.,	G. & Ag.,	Polk City,	Polk.
Mills, Ella,	L.,	Jefferson,	Greene.
†Mills, Frank W.,	G. & Ag.,	Maxwell,	Story.
Moore, John H.,	C. E.,	Hedrick,	Keokuk.
Morrison, John,	C. E.,	Hedrick,	Keokuk.
Morton, Olivia M.,	L.,	Clarion,	Wright.
Moss, Berkely N.,	C. E.,	Brownville,	Mitchell.
Ney, William C.,	C. E ,	Independence,	Buchanan.
Nichols Mary A ,	L.,	State Center,	Marshall.
Oggel, E. Christian,	G.& Ag.,	Orange City,	Sioux.
Patterson, Estella,	L.,	Eldora,	Hardin.
Pond, Lant M.,	G.& Ag.,	Independence,	Buchanan.
†Perkins, Albert B.,		Burlington,	Des Moines.
Richman, Mary S.,	L.,	Muscatine,	Muscatine.
Rickey, Millard L.,	G. & Ag.,	Wellman,	Washington
†Roddis, May,	L.,	Cherokee,	Cherokee.
Roddis, Ezra E..	M. E.	Cherokee,	Cherokee.
Sabin, George D.,	G. & Ag.,	State Center,	Marshall.
Shaum, Benjamin F.,	C. E.,	Columbus City,	Louisa.
Spaan, John,	G & Ag.,	Orange City,	Sioux.
Steele, Walter D.,	M. E.,	Keokuk,	Lee.
Swift, C. Willis,	M. E.,	Charles City,	Floyd.
Taylor, George M.,	G. & Ag.,	Polk City,	Polk.
Thompson, Adie R.,	G. & Ag.,	Maxwell,	Story.

†Tripp, George E.,	M. E.,	Ames,	Story.
†Veneman, Fred M.	G. & Ag.,	Maxwell,	Story.
†Waynick, Frank D.,	G. & Ag.,	Chariton,	Lucas.
Waynick, Fred M.,	G. & Ag.,	Chariton,	Lucas.
Whitehead, Frank E.	G. & Ag.,	Moingona,	Boone.
Woodruff, S Jay,	C. E.,	Dow City,	Crawford.
†Woods, Charles M.,	G. & Ag.,	Woodward,	Dallas.
Zenor, Leslie L.,	G. & Ag.,	Ames,	Story.
†Zimbelman, John F.,	G. & Ag.,	Boone,	Boone.

—Total 90.

VETERINARY.

Knowles, Clifton B.,	James,	Plymouth.
Kooser, Samuel S.,	Ames,	Story.
Lodge, Charles H.,	Marrietta,	Marshall.
McLaughlin, James J.,	Webster City,	Hamilton.
Oliver, J. Frank,	Whittemore,	Kossuth.
Williams, Albert R.,	Glenwood,	Mills.

—Total 6.

SPECIAL STUDENTS.

NAME.	POST OFFICE	COUNTY.
Bishop, Jay A.,	Lexington,	Washington.
Ferguson, Flora S.,	Niles,	Floyd.
Gaston, Belle L.,	Marshalltown,	Marshall.
Gilbert, Ellis T.,	Council Bluffs,	Pottawattamie
Hammer, Edward W.,	Des Moines,	Polk.
Hoxie, Mrs. H. E.,	Anamosa,	Jones.
Johnston, Mary B.,	Ames,	Story.
Knapp, Bradford,	Ames,	Story.
Manlig, Anton,	State Center,	Marshall.
McDonald, Oliver P.,	Sigourney,	Keokuk.
Mott, Lincolnette,	Hampton,	Franklin.
Waterbury, E. Belle,	Nashua,	Floyd.
Patterson, Estelle,	Eldora,	Hardin.
Robbins, Alice,	Buttsville,	*Missouri.*
Wright, Lulu B.,	Ames,	Story.

—Total 15.

†Deficient in one or more studies

ABBREVIATIONS IN COURSES OF STUDY.

Civil Engineering,	C. E.
Mechanical Engineering,	M. E.
Ladies' Course,	L.
Course in Agriculture	Ag.
General Course in the Sciences,	G.

The General Course is identical with the Agricultural Course in the Sophomore and Freshman years; hence names in both courses are marked "G. & Ag."

SUMMARY.

Resident Graduates,	4.
Seniors.	38.
Juniors,	51.
Sophomores,	61.
Freshmen,	96.
Special Students,	15.
Total Enrollment	*265.

*The above enrollment is for only the spring term of 1888. Previous catalogues have been for the full year Hence this enrollment though it seems smaller is not relatively so.

NOTES, CORRECTIONS AND ADDITIONS. *Horticulture* is an optional study in the Ladies' course.

History. The course in History is varied somewhat from year to year.

Latin. It has been found best to have a class of beginners in Latin. See page 59. Also page 26

Agriculture. In 1889 the entire Sophomore instruction in Agriculture will probably be either by the President or by the Professor of Agriculture, instead of partly by each as given on pages 64 and 65. Field lectures may also expected in the Sophomore class.

HISTORICAL.

In 1858 the Legislature of Iowa passed an act to establish "A State Agricultural College and Model Farm," to be connected with the entire Agricultural interests of the State; appointed a board of commissioners to buy a farm and erect a college building, and elected a board of trustees to select a faculty and organize a college. In 1859 a farm of six hundred and forty acres, situated near Ames, was purchased for the use of the college. This college and farm were entirely an agricultural institution.

In 1862 a bill was passed by Congress, entitled, "An act donating public lands to the several States and Territories, which may provide colleges for the benefit of Agriculture and the Mechanic Arts."

Section 1 of this bill says: "Be it enacted by the Senate and House of Representatives of the United States of America, in Congress assembled, that there be granted to the several States for the purpose hereinafter mentioned, an amount of public land, to be apportioned to each State in quantity equal to thirty thousand acres for each Senator and Representative in Congress to which the States are respectively entitled by the apportionment under the census of 1860: Provided that no mineral lands shall be selected or purchased under the provisions of this act."

Section 4 requires: "That all moneys derived from the sale of the lands aforesaid by the States to which the lands are apportioned, and from the sale of land scrip, hereinbefore provided for, shall be invested in stocks of the United States, or some other safe stock, yielding not less than five per centum on the par value of said stocks; and that the money so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished (except as may be provided for in section fifth of this act), and the interest of which shall inviolably be appropriated by each State which may take and claim the benefit of this act, to the endowment, support and maintenance of at least one college, where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to

teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may provide, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

Section 5 says: "And be it further enacted, That the grant of land and land scrip hereby authorized shall be made on the following conditions, to which, as well as to the provisions hereinbefore contained, the previous assent of the several States shall be signified by Legislative acts: First, if any portion of the fund invested as provided by the foregoing section, or any portion of the interest thereon, shall, by any action or contingency, be diminished or lost, it shall be replaced by the State to which it belongs, so that the capital of the fund shall remain forever undiminished; and the annual interest shall be regularly applied without diminution to the purposes mentioned in the fourth section of this act, except that a sum not exceeding ten per centum upon the amount received by any State under the provisions of this act, may be expended for the purchase of lands for sites or experimental farms, wherever authorized by the respective Legislatures of said States. Second, no portion of said fund nor the interest thereon, shall be applied, directly or indirectly, under any pretense whatever, to the purchase, erection, preservation, or repair of any building or buildings."

In 1872 the General Assembly accepted the grant upon the conditions and under the restrictions contained in the act of Congress, and by so doing entered into a contract with the General Government to erect and keep in repair all buildings necessary for the use of the College. By this action of the General Assembly the College was changed from a purely agricultural institution to a College of Agriculture and Mechanic Arts, with the broad and liberal course of study outlined in the following paragraph.

In 1882 the General Assembly passed an act defining the course of study to be pursued, as follows: Section 1. That section 1621 of the Code is hereby repealed, and the following is enacted in lieu thereof: Section 2621. That there shall be adopted and taught at the State Agricultural College a broad, liberal and practical course of study, in which the leading branches of learning shall relate to agriculture and the mechanic arts, and which shall also embrace such other branches of learning as will most

practically and liberally educate the agricultural and industrial classes in the several pursuits and professions of life, including military tactics. Section 2. That all acts and parts of acts inconsistent with this act are hereby repealed.

The income from the endowment fund averages about $45,000 per year, about $30,000 of which is expended for salaries of professors, assistant professors, instructors and foremen. The remainder is required for the necessary running expenses of the various departments and minor expenditures of the College, and for the purchase of chemical, physical and other apparatus. New buildings are erected and repairs are made from special Legislative appropriations for the purpose.

The College was formally opened on the 17th of March, 1869.

LOCATION.

The College occupies a delightful and healthful location, on high, rolling land, a mile and a half west of the town of Ames, at the junction or crossing of two lines of the Chicago & Northwestern Railway, in the center county (Story) of the State, and thirty-seven miles north of the city of Des Moines. The railroad facilities for reaching Ames from every part of the State are good. Regular conveyances for passengers and baggage run between the railway station and the College three times each day.

BUILDINGS, GROUNDS AND EQUIPMENTS.

The main College Building is four stories high above the basement and is 158 feet long by 112 feet deep through the wings. In the basement (which is almost wholly above ground and is thoroughly lighted and well ventilated) are the dining-room, kitchen, rooms for help, and the armory. On the first floor, proper, are the chapel, the library, reception-rooms, recitation-rooms, music-rooms, and offices of the teachers and of the steward. On the second floor are several recitation rooms and rooms for students. On the third and fourth floors are students' rooms and the zoological and geological museums. About two hundred stu-

dents can be accommodated with rooms in this building. All the rooms are heated by steam and lighted by electricity. Pure spring water is supplied in all the stories of the building, forced up by steam pump.

There are also two Boarding Cottages, brick buildings, affording rooms for ninety students, with dining-rooms, kitchens, and store rooms. The cottages are supplied with pure water and lighted by electricity.

The Chemical and Physical Hall is a large two-story brick building, 70x44 feet, with a wing 61x31 feet. The first floor contains the chemical laboratories; the second the physical laboratory, apparatus, and lecture room, while two draughting rooms occupy the third floor. In the basement are the heating apparatus and a large recitation room. This building is warmed by steam and supplied with water and gas.

North Hall is a two-story brick building, 40x70 feet. On the first floor are the rooms for the departments of agriculture and zoology, and on the second floor are the rooms of the botanical department.

Horticultural Hall is a frame building, containing on the first floor a large lecture room and a tool room. On the second floor is the horticultural museum. The cellar has two large rooms, one for the storage of garden products, the other for the use of the nursery propagating department A grafting room and propagating house are attached, heated by hot water.

South Hall is a two-story brick building, which has been refitted for the department of Domestic Economy, and contains the accessories of a model home as well as apparatus for instruction.

The Office is a substantial two-story brick building, for the use of the Board of Trustees, the President, Secretary and Treasurer.

Six dwelling-houses upon the College grounds are occupied by professors' families, and several others by foremen and employes.

The College Creamery, a frame building, is conveniently situated near the farm house. The farm barns are adjacent—one of brick, for horses, and one large frame barn, in the basement of which is a stable for one hundred head of cattle

The Veterinary Buildings, costing ten thousand dollars, comprise a building for the offices and class-rooms of professors in

this department, and a hospital with all the modern appliances for the treatment of diseased animals. The Department of Veterinary Science is the best equipped for the work of any in the Western States.

The Work-shop is a two-story frame building, fitted up with power, machinery and tools for the prosecution of repairs, and for instruction in mechanical work in wood.

The new Hall for the Department of Civil and Mechanical Engineering is a substantial brick building, one of the most commodious and attractive on the College Domain, and furnishes all necessary accommodations for these rapidly growing departments; including power, machinery and tools for working in iron and other metals.

THE COLLEGE GROUNDS.

The College Domain, includes about 900 acres. Of this about 120 acres are set apart for College Grounds. These occupy the high land of the southwest part of the farm and include the campus, shrubbery plantations, young forestry plantations, the flower borders and gardens, with the surroundings of the professors' dwellings. Gravel drives and walks lead to all parts of the grounds and to the various buildings, and the true principles of landscape gardening have been so faithfully observed in the grading and in the location of buildings and drives, as to make of the entire campus a large and beautiful park. The view of the surrounding country from the upper stories and towers of the Main Building is one of wide extent and great beauty.

Directions to Candidates and Students.

REQUIREMENTS FOR ADMISSION.

Students seeking admission to the College must be at least sixteen years of age.

Candidates for membership in the Freshman class, must bring testimonials of good moral character and give evidence of a thorough knowledge of Orthography, English Grammar, Arithmetic, United States History, Human Physiology (and except in the Veterinary course) Algebra through simple equations, and those who wish to pursue Latin, especially in the gentlemen's courses, should show a thorough knowledge of the Latin Paradigms, and of the Latin Reader or Lessons.

Entrance Examinations will be held at the College on the first and second days of each term. The first class teachers' certificates of a county Superintendent will be received in lieu of an examination in the studies covered thereby. Special arrangements may be made with the President of the College for examinations by the principals of high schools having an approved course of study, but all such examinations and certificates must date within one year.

Candidates may be conditioned for one year in physiology, if their examinations show high standing in all other required branches.

Candidates for advanced standing must pass examinations here in all studies pursued up to the time and grade they wish to enter. Those from other colleges must bring certificates of honorable dissmission and marks showing standing. The latter may, on approval of the Faculty of the College, be taken in lieu of examination.

N. B.—THE COLLEGE YEAR begins February 29, not in September (See calendar, page 5). That is the only proper time for new students to enter, unless fully prepared for advanced standing. Still further, it is almost invariably true that even a few days' absence at the beginning of any term makes real success impossible for the tardy pupil, and greatly retards the class he tries to overtake. Students who arrive later than the second week of any term will not be admitted except on clear proof of ability to overtake and keep up with the class. One must be on hand when the train starts or wait for the next train.

HOW TO ENTER THE COLLEGE.

Persons who desire to enter the College as new students should comply with the following directions:

1. First write to the President for college catalogue, and study carefully and comply with the "Requirements for Admission" on page 26, immediately preceding this. Then write to the President about one month before the beginning of the term, asking for a card of inquiry and information.

2. On receiving the card of inquiry, write an answer opposite each question and mail the card to the President. If the answers you give accord with the "Requirements for Admission," a card of introduction will be sent you, which simply entitles you to admission on passing the examinations or giving the required proof of proficiency.

3. When you arrive, at the opening of the term, present this card of introduction to the Steward, in his office at the rear of the chapel in the main building; select your room, pay the rent, make your deposit, (see page 29), and, without loss of time, show your receipt therefor to the President at his office, south of the main building. If you have not the proper certificate of proficiency in the studies required, you will there secure a card for examination.

4. Attend punctually every examination at the time and place indicated on that card. When all the examinations are completed, and your standings therein are marked on the card, return it to the President at his office. If you have passed the studies required with a standing of 3 or over, (4 being perfect), you will then sign the Student's Record Book and Contract, and secure a card of classification, which certifies your admission to the College and assigns you to your proper classes.

5. Present the card of classification to each of the teachers having charge of the classes to which you are assigned, and attend thereafter every recitation of the term.

The contract signed by every student upon entering the College and by the President of the College, is as follows:

> We, the Faculty of Iowa Agricultural College, hereby agree that we will guarantee to the students of 1888 all the privileges and instructions set forth in the College Catalogue, and that the laws we make shall be simply for their advancement and the good government of the Institution.
>
> W. I. CHAMBERLAIN, President.

I hereby agree, on entering the College, in 1888, that I will respect and obey its laws, and, except in case of necessity, illness or unforseen misfortune, remain the entire term on which I enter

Signed . . . . Student.

THE CLASSIFICATION OF STUDENTS.

Students having back studies at the commencement of any term may, at the discretion of the Executive, be classified in all such back studies.

N. B.—To enable students to pass examinations in any back studies, such examinations as may be necessary will be held during the first week of each term. At the beginning of the year in February no student can classify for promotion unless he has passed a satisfactory examination on all studies but one of the preceding year, and that study must be passed by the end of the first week *of the next term.*

☞See notice in black faced type, page 26.

STUDENTS' EXPENSES, ETC.

No charge is made for tuition to Iowa students. To those who come from outside the State $15.00 tuition per term will be charged.

For board, heating, lighting, cleaning and care of the college buildings, students pay less than the items actually cost the Institution. Injury to college property, of whatever sort, is charged to the author, when known; otherwise to the section, or the entire body of students, as may seem most just in the given case.

Students who board in any of the college buildings furnish their own bedding, and all furniture for their rooms, excepting bedsteads, washstands, tables and wardrobes, and are advised to bring from home carpets, etc., to make their rooms comfortable and cheerful. Male students in the lower classes, not physically disabled, are required by law to take the military drill, and purchase uniforms therefor.

The current expenses of students during the year 1887, were about as follows:

In the Main College Building --	
Board per week	$2 25
Lighting and heating, per week	40
Incidentals per week	21
Room rent, per term	3 00 to 4 00
Hospital fees per term*	75
In the Boarding Halls	
Board per week	2 00
Fuel and lighting, per week	25
Janitor's fee, per term	3 00
Hospital fees, per term*	75
Room rent	2 00 to 3 00
For day students --	
Janitor's fee, per term of seventeen weeks	4 00

*NOTE.—A commodious and secluded hospital building is provided, and this hospital fee of 75 cents insures to each student free nursing and medical attendance in case of accident or sickness. This gives the means also of checking and controlling the measles and other contagious diseases should they appear. The hospital has proved to be a great blessing to the students.

As security for the payment of all bills against him, each student, at the opening of the term, is required to make deposits with the Steward as follows:

On board account in main building (for those who board there) ..	$20 00
On board account in boarding hall (for those who board there)	15 00
On room and furniture account..	5 00
On General breakage and damage account .	1 00

These deposits will be returned on final settlement at the close of the term

All bills for each month must, without fail, be settled at the Steward's office on the second Saturday of the month following.

The dining room will be opened on the evening preceding the respective days on which the spring and fall terms commence. No allowance on board bills is made for absences. Students and others who bring guests to their tables are required to purchase meal tickets. All students are required to board and room in the main building or in one of the cottages, except when permission to board elsewhere has been for good reason granted by vote of the Faculty.

Text books and stationery may be purchased at the College Book-store at ten per cent. advance on publishers' wholesale prices.

MANUAL LABOR—SHOP, LABORATORY AND FIELD PRACTICE.

The following regulations in regard to manual labor have been adopted by the Board of Trustees:

1. The manual labor of students is divided into two kinds, viz: uninstructive labor, which shall be paid for in money; and instructive labor, which shall be compensated by the instruction given and the skill acquired.

2. Uninstructive labor shall comprise all the operations in the work-shop, the garden, upon the farm and elsewhere, in which the work done accrues to the benefit of the College and not to that of the student. Instructive labor shall embrace all those operations in the work-shops, museum, laboratories, experimental kitchen, upon the farm and in the gardens, in which the sole purpose is the acquisition of knowledge and skill.

3. Students shall engage in instructive labor in the presence and under the instruction of the professor in charge, according to the statement made in each of the courses of study.

4. The compensated labor furnished by the Department of Agriculture and Horticulture, of Veterinary Science, and of Engineering, is given by each to its own students, and is eagerly sought.

5. The "details" of compensated labor supplied by the needs of the other departments will be given to the most faithful and meritorious students of the Course in Sciences Related to the Industries.

6. Uninstructive labor is paid for according to its value to the College, but no student should expect to pay the main part of his expenses by labor while here.

GOVERNMENT.

The crowded buildings of the College and the nature of the exercises, complicated as they are by laboratory work, shop practice and manual labor, make order, punctuality and systematic effort indispensable. This Institution, therefore, offers no inducements to the idle or self-indulgent. All who are too independent to submit to needful authority, or too reckless to accept wholesome restraint, are advised to go where the courses of study are easier, and the requirements are consequently less. The discipline of the College is confined mainly to sending away promptly those who prove on fair trial and faithful admonition to be of the above class, and to be doing more harm to the institution than can be compensated by any benefit they may themselves receive. Those who share here the benefits of the State and National endowments are expected to show themselves worthy of them.

The use of tobacco by students is forbidden. The presence of ladies and of members of the Faculty in the various rooms and halls renders this imperative, to say nothing of other considerations. Those who are already so addicted to the use of tobacco that they cannot cheerfully submit to this regulation are advised to go elsewhere. Of course the use of intoxicating beverages and of profane and obscene language is also forbidden.

PUBLIC WORSHIP.

Officers and students gather daily in the chapel for public worship. On Sunday afternoon a discourse is given in the chapel by the President, one of the professors, or a clergyman invited

for the occasion. The object of these services is to emphasize and enforce the principles of morality and of the Christian religion; but in a State Institution like this it would be manifestly improper to teach or to controvert the tenets of sectarianism.

The Faculty require on Sunday such conduct and decorum in and about the College buildings as are fitting to the observance of the Sabbath.

COURSES OF STUDY.

Six courses of study are offered, as follows:

(1.) *The Course in Sciences Related to the Industries* requires four years and aims to give a liberal culture in the sciences and other branches of learning which underlie the great industries of the country, without especially directing it towards any particular pursuit or profession. The degree of Bachelor of Science (B. Sc.) is conferred upon those who complete this course.

(2.) *The Course for Ladies* requires four years and meets a growing demand for the higher education of women. It provides an opportunity for a more thorough study of literature along with a somewhat lighter course in the natural sciences and mathematics. It leads to the degree of Bachelor of Letters (B. L.)

The other five courses are technical and aim to meet the requirements of a special pursuit or profession. Those established are as follows:

(3.) *The Course in Agriculture*, which requires four years of study, leads to the degree of Bachelor of Science (B. Sc.)

(4.) *The Course in Mechanical Engineering*, of four years, leads to the degree of Bachelor of Mechanical Engineering (B. M. E.)

(5.) *The Course in Civil Engineering*, of four years, leads to the degree of Bachelor of Civil Engineering (B. C. E.)

(6.) *The Course in Veterinary Science*, of three years, leads to the degree of Doctor of Veterinary Medicine (D. V. M.)

The candidate for graduation in any course must have secured a standing of 3 (4 being perfect) in all his studies, and in all technical courses must present a final thesis. Candidates in the Science and Ladies Courses prepare commencement orations. The theses and orations must be submitted to the Faculty four weeks before commencement. In preparing either, the student

at the beginning of the senior year selects any general study in science or literature pursued by him, and announces such choice to the President and to the Professor under whom he pursued the study thus selected. The Professor will then, on consultation with the student, assign to him some special topic or line of special investigation, and will criticise and approve the general plan and method of his work during its progress. On completion of the theses or oration, the student will read it to the Professor for final criticism. A neat ink copy must be made by the student on paper of uniform size and style, designated by the College, to be bound and preserved in the College library.

The graduation fee in each course is five dollars. For the full course of study in each of the above courses, and for remarks thereon, see the following pages.

☞ See notice in black face type, page 26.

Course in Sciences Related to the Industries.

Freshman Year.

FIRST TERM	SECOND TERM
Algebra, Advanced—5*	Botany, Elementary - 2.
Drawing—2.	Drawing—2
Drill, Military—2.	Drill, Military—2
Elecution—1	Geometry—5
English Language and Composition 4	Horticulture—2
History--5; or Latin—5.	Lectures, Field, on Horticulture with practice 5 hours
Lecture, Field, on Agriculture with practice 5 hours.	Rhetoric, Applied—3, or Latin—4
Stock-Breeding—2	Zoology, Elementary - 2

Sophomore Year.

FIRST TERM	SECOND TERM
Agriculture, Practical—2	Botany, Vegetable Anatomy—3.
Botany, Systematic—2	Laboratory Practice—1
Chemistry, General—3,	Chemistry, General—2
Laboratory Practice - 2§	Laboratory Practice—2
Drill, Military—2.	Drill, Military—2
Entomology—2	Geometry, Analytical 5†
Physics, Mechanics—2	Horticulture - 2
Surveying, Land—5, eight weeks	Physics, Heat 3.
Practice, Field 2	Zoology 3
Trignometry, Plain—5, nine weeks	Labratory Practice - 1

Junior Year.‡

FIRST TERM	SECOND TERM
Botany Cryptogamic and Physiological—3.	Chemistry, organic—3
Labratory Practice—1	Laboratory Practice--1.
Calculus—5 †	Economy, Political--3
Chemistry, Quantitative 2	German 5
Laboratory Practice 3	Literature, English—5
Elocution—2.	Physics Light and Sound—3.
German -5	Laboratory Practice 1.
Law, Commercial—2.	Physiology—4
Literature, English—3	
Physics Magnetism and Electricity - 3	
Zoology—2	
Laboratory Practice - 1	

Senior Year.‡

FIRST TERM		SECOND TERM
Anatomy of Domestic Animals—5	or	Civilization, History of--5
Astronomy—5.		Ethics and Civics—4.
Brain, the human—5, three weeks		Medicine and Surgery, Vetinary—5.
Chemistry, Agricultural Lab Prac. 2		Oration, Preparation of—1
Gardening, Lanscape—1.		
Geology and Mineralogy—5.	or	
German—5.		
Psycbology—5, fourteen weeks		

* These figures indicate the number of recitations per week

§ In all Labratory work three hours count as one recitation

† Students standing 3 70 in Trigonometry may take Analytical Geometry and omit Botany or Zoology

‡ In the Junior and Senior years the student is permitted to select from the list for each term a number of studies aggregating not less than fifteen nor more than eighteen exercises per week.

The Course for Ladies.

Freshman Year.

FIRST TERM	SECOND TERM.
Algebra, Advanced—5.	Botany, Elementary—2.
~~Drawing—2~~	~~Drawing—2~~
Economy, Domestic 1	Elocution 2.
Laboratory Practice -1.	French—5, or Latin—5
Elocution—1.	Geometry—5
English Language and Composition 4	Rhetoric, Applied—3.
French—5, or Latin - 5	Zoology, Elementary—2 optional

Sophomore Year.

FIRST TERM	SECOND TERM
Botany, Systematic—2	Economy, Domestic—1
French—4, or Latin—4	Laboratory Practice--1
History, Ancient—2.	French -4, or Latin 4
* And choice of Chemistry—3, and Labratory Practice—2, or any two of the following sciences Entomology—2, Physics—2, Trigonometry—5, nine weeks	History, Modern—2
	And a choice of two of the following Sciences Botany—4, Chemistry 4, Analytical Geometry—5, Physics—3, Zoology- 4

* Provided always that no science shall be elected for less than two terms nor any which the pupil is not prepared to take.

Junior Year.

FIRST TERM.	SECOND TERM
Elocution—2	Economy Domestic 1
German—5	Laboratory Practice—1
Literature, English 3	German 5
† And choice of two of the following Studies * Botany 4, Calculus—5, Chemistry- 5, Physics—3, Zoology -3, Commercial Law—2.	Literature, English—5
	† And choice of not less than three nor more than six hours from the following studies Chemistry—4, Political Economy—3, Physics - 4

† For the amount of class and laboratory work see same year in Science Course

Senior Year.

FIRST TERM.	SECOND TERM.
Brain, the Human—5 three weeks	Civilization, History of—5
Geology—5, or Chemistry of first term of Sophomore or Junior year	Ethics and Civics—4
German—5.	Oration, Preparation of—1
Psychology—5, fourteen weeks	Physiology -4

The Course in Agriculture.

Freshman Year.

FIRST TERM	SECOND TERM
Algebra, Advanced—5	Botany, Elementary—2
Drawing—2	Drawing—2
Drill, Military—2	Drill, Military 2
Elocution—1	Geometry—5
English Language and Composition 4	Horticulture—2
History—5, or Latin 5	Lectures, Field, on Horticulture, with Practice 5 hours.
~~Lectures, Field, on stock-breeding and~~ care, with Practice 5 hours	Rhetoric, applied 3, or Latin—5
Stock-breeding—2	Zoology, Elementary—2

Sophomore Year.

FIRST TERM	SECOND TERM
Agriculture, Practical—2	Botany Vegetable Anatomy—3
Botany, Systematic—2.	Laboratory Practice—1
Chemistry, General—3.	Chemistry, General—2
Laboratory practice—2.	Laboratory Practice—2.
Drill, Military—2.	Drill, Military—2.
Entomology—2	Horticulture—2
Physics Mechanics—2.	Physics, Heat—3
Surveying Land—5, eight weeks.	Zoology—3
Trigonometry, plain—5, nine weeks.	Laboratory Practice—1.

Junior Year.

FIRST TERM	SECOND TERM
Botany Cryptogamic and Physiological—3	Botany, Applied—1.
Laboratory Practice—1.	Labratory Practice—1
Chemistry, Quantitative—2	Chemistry, organic—3.
Laboratory Practice—3	Labratory Practice—1.
Horticulture—2.	Dairying—2.
German—5, or	Economy, Political—3
Law, Commercial—2, and	Horticulture—3
Literature, English—3,	German—5, or
Physics Magnetism and Electricity—3 or	Literature, English—5.
Zoology—2.	Farm and Garden Instruction 8 hours per week.
Laboratory Practice—1.	
Farm and Garden Instruction 8 hours per week	

Senior Year.

FIRST TERM	SECOND TERM
Agriculture, Experimental—4	Agriculture—3.
Anatomy of Domestic Animals—5	Climatology—1.
Chemistry, Agricultural Lab Prac—3.	Civilization, History of—3.
Gardening, Lanscape—1.	Drainage—1.
Geology—5, or	Ethics—3.
German—5, or	Insects, Injurious—1
Psychology—5	Pathology, Vegetable—2
Stock-feeding—1.	Thesis finished 4 weeks before close of term
Farm Practice 7 hours per week.	Medicine, Veterinary—5.
	Farm practice 10 hours per week.

The Course in Mechanical Engineering.

Freshman Year.

FIRST TERM	SECOND TERM.
Algebra, Advanced--5.	Drawing, Free-hand, 4 hours per week
Drawing, Free hand, 4 hours per week.	Drill, Military---2
Drill, Military---2	Elocution--2.
Elocution---1	French---5.
English Language and Composition -4	Geometry- 5.
French---5.	Rhetoric, Applied-- 3.
Shop Practice 10 hours per week.	Shop Practice 10 hours per week

Sophomore Year.

FIRST TERM.	SECOND TERM.
Chemistry, General - 3.	Chemistry, General—3
Laboratory Practice--2.	Laboratory Practice--2.
Drill, Military---2	Drawing, Mechanical--2
Drawing---2	Drill, Military--2.
Geometry, Descriptive --2.	Geometry, Analytical---5.
Physics Mechanics---2	Physics Heat--3
Shop work 10 hours per week.	Shop-work, 10 hours per week
Trigonometry and Surveying--5.	
Field Practice—1	

Junior Year.

FIRST TERM.	SECOND TERM
Calculus--5	Drawing Mechanical—2.
Literature, English--3	Economy, Political—3, or
Physics Magnetism and Electricity--3	Literature, English 5.
Shop-work 10 hours per week.	Mechanics, Analytical 5
Stereotomy and Drawing---4	Physics, Special 3
	Laboratory Practice 2.
	Shop-work 10 hours per week

Senior Year.

FIRST TERM.	SECOND TERM.
Drawing, Mechanical—2	Designing—2.
Materials, Resistance of—5.	Drawing, Mechanical—2.
Mechanism, Principles of and	Engineering, Mechanical 5
Engineering, Mechanical—5.	Physics Laboratory Practice—2
Thermodynamics—5	Shop work 10 hours per week
Shop-work 10 hours per week.	Thesis finished—5.
Thesis begun.	

The Course in Civil Engineering.

Freshman Year.

FIRST TERM	SECOND TERM
Algebra Advanced—5.	Botany, Elementary 2
Drawing, Free-hand 3 hours per week.	Drawing Free hand 3 hours per week
Drill, Military 2.	Drill, Military 2
Elocution--1.	Elocution 2.
English, Language and Composition -4	French—5
French—5.	Geometry 5.
History- 5	Rhetoric Applied 3

Sophomore Year.

FIRST TERM	SECOND TERM
Botany, Systematic —2.	Drill Military 2
Chemistry, General 3.	Field Practice 1
Laboratory Practice - 2	Geometry Analytical 5
Drill, Military 2.	Physics Heat 3
Field Practice 1.	Surveying, Railway 5.
Geometry Descriptive —5	
Physics Mechanics—2	
Surveying and Trigonometry 5	

Junior Year

FIRST TERM	SECOND TERM
Calculus—5.	Economy, Political- 3
Materials Resistance of —5.	Electricity Special--3.
Physics Magnetism and Electricity 3.	Laboratory Practice-- 2.
Stereotomy and Drawing—4	Engineering, Sanitary--3.
	Mechanics, Analytical- -5.
	Surveying, Railway--3

Senior Year.

FIRST TERM	SECOND TERM.
Designing—3	Civilization, History of--3.
Geology--5	Designing--5.
Psychology 5	Lectures--3.
Structures, Bridge and Roof - 5.	Structures, Bridge and Roof 5
Wood, Structure of--1	Walls, Retaining -2.
Thesis begun.	Thesis, Preparation of--3

The Course in Veterinary Science.

Freshman Year.

FIRST TERM	SECOND TERM.
Anatomy of Domestic Animals--5	Anatomy of Domestic Animals--2.
Dissection and Clinic 4 aft n s per wk.	Botany, Elementary 2
Drill, Military -2.	Dissection and Clinic, 3 aftern'ns p wk.
English Language and Composition-4.	Drill Military—2
Historology--2.	Medicine, Veterinary—5.
Laboratory Practice- 1	Physiology- 4.
	Zoology- 2.

Junior Year.

FIRST TERM	SECOND TERM
Botany Systematic—2	Anatomy of Domestic Animals--2
Chemistry, General -3	Chemistry 3.
Laboratory Practice- 2.	Laboratory Practice--3.
Dissection and Clinic 2 aft noons p wk.	Clinic, 1 afternoon per week.
Drill Military 2	Drill Military -2.
Materia Medica -4	Medicine, Veterinary--3.
Physiology- 3	Opthalmology—1.
Zoology -2	Pathology General- 2.
Laboratory Practice 1.	Laboratory Practice--1.
	Parasites Animal- 2.

Senior Year.

FIRST TERM		SECOND TERM.
Botany, Cryptogamic 2.		Anatomy of Domestic Animals—5.
Laboratory Practice 2	1st 5 weeks	Clinics, five afternoons per week.
Chemistry—2		Medicine Veterinary Principles and
Laboratory Practice—3		Practice 3
Clinics 5	1 after	Obsteterics- 1
Pathology, Comparative - 2.	5th week.	Opthalmology—1
Therapeutics—2.		Surgery, Principles of Operation--1
Surgery Veterinary Principles and		Therapeutics -2
Practice—3		Therapeutics Surgical--1
Thesis begun		Thesis finished 4 w ks before close term

TIME TABLE OF LABORATORY EXERCISES AND SHOP WORK.

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY.	SATURDAY.
FRESHMEN. FIRST TERM	**Shop Work.** 7 15—12:00	**Shop Work.** 7 15—12 00		**Free Hand Drawing** 9—11	**Free Hand Drawing** 9—11	
SECOND TERM.	**Shop Work.** 7 15—12 00.	**Shop Work.** 7 15—12 00		**Free Hand Drawing** 9 11	**Free Hand Drawing** 9 11	
SOPHOMORES. FIRST TERM	**Chemistry.** Engineers and Veterinarians **Surveying** 2—5 P M	**Chemistry,** General. **Surveying.** 2—5 P M	**Chemistry.** Engineers 2 4 P M.	**Chemistry.** (General) 2—5, P M	**Shop Work.** 1 -5 P M	**Shop Work.** 7--12 A M.
SECOND TERM	**Shop Work,** 1—5. **Chemistry** (General 2 5 P M.	**Shop Work,** 1—5 **Chemistry.** Veterinarians **Zoology.** General 2—5 P. M	**Chemistry.** Veterinarians 2 5. P M. **Botany.** 1—4 P M	**Mechanical Draw'g** 2—5. P. M **Chemistry.** (General 2 - 5. P M	**Mechanical Draw'g** 2--5 P M. **Zoology.** **Botany.** 2---5 P M	
JUNIORS. FIRST TERM.	**Mechanical Draw'g** 2—5, P. M. **Chemistry,** Veterinarians **Botany.** General 2—5, P M.	**Shop Work.** 1—5 P M **Zoology,** 2—5 P M.	**Mechanical Draw'g** 2—5, P M. **Chemistry.** Veterinarians) **Botany,** 2—5, P M	**Shop Work.** 1—5. P. M. **Chemistry.** **Zoology.** (Veterinarians) 2—5, P M	**Chemistry.** 2 -5 P. M.	
SECOND TERM.	**Mechanical Drawing,** 2—5, P. M.	**Mechanical Drawing,** 2 - 5. P. M	**Physics,** (General) 2 5, P M.	**Shop Work** 1- 5 P M **Botany.** 2--5 P. M.	**Chemistry.** (Gen l and Agr l) **Physics,** Engrs) 2---5. P M	**Shop Work.** 1—5, P M
SENIORS. FIRST TERM.	**Mechanical Drawing.** 2—5, P M.	**Shop Work.** 1—5 P M	**Mechanical Draw'g** 2—5 P M, **Chemistry. Botany.** 2—5 P M	**Shop Work,** 1- 5. P. M.	**Chemistry.** 2--5 P. M	
SECOND TERM.	**Mechanical Drawing.** 2—5 P. M	**Mechanical Drawing** 2—5, P M		**Shop Work.** 1- 5 P. M.		**Shop Work.** 1--5, P. M.

TIME TABLE---FRESHMAN YEAR.

FIRST TERM.

11 A M --12	1 P. M - 2	2—3	3—4.	4—5
French—5. Latin—5	Algebra -5. English Language and Composition M. TU., W. TH	Algebra 5 English Language and Composition M TU W TH	History —5.	Elocution, M. Domestic Economy, TU Stock Breeding TU., TH Military Drill, W., F 4 P. M --5 20

SECOND TERM.

French—5. Latin--5	Geometry 5	Applied Rhetoric, M W., F. Botany TU., TH Elocution, M., W.,	Appl'd Rhetoric TU TH F. Zoology M W Elocution TU TH.	Horticulture, TU TH Military W F. 4 P. M —5 20.

SOPHOMORE YEAR.

FIRST TERM.

8 A M —9	9--10	10 -11	11 12	1 P M - 2.
Trigonometry and Surveying 5	History W F Elocution, TU., TH Agriculture W., F. Chemistry (Vet) M., W., F	Chemistry (Eng) W F Entomology W F Botany TU., TH Descrip. Geometry TU., TH	Chemistry M., W F Physics TU TH.	French, M TU W TH Latin, M TU W., TH. Military Drill, W F 4 P M. -5 20

SECOND TERM

Analytical Geometry -5	Botany M., W., F. History TU - TH Chemistry, (Vet.) M F., W Railroad Surveying- 5.	Physics, W M., F Chemistry, TU TH	Zoology, M., F W. Horticulture, TU., TH. Chemistry, (Eng M W F	French M., TU., W TH Latin M., TU., W TH, Dom. Economy F --4 P. M.-5 Military, W F 4 P. M —5 20

TIME TABLE---JUNIOR YEAR.

FIRST TERM.

8 A M 9	9—10	10—11	11—12.	1 P M. 2
German- 5 Elocution, TU, TH Resistance of Materials—5	Calculus- 5 Horticulture TU TH.	English Literature M W F Commercial Law, TU TH.	Physics, M W F. Chemistry TU TH Elocution TU TH.	Botany M W F Zoology, TU TH

SECOND TERM.

German—5. Special Physics, TU TH F Political Economy—5 7 A. M —8	Physiology, TU W TH F Horticulture, M W. F Applied Botany TU. Domestic Economy, M Analytical Mechanics 6	Political Economy, M W. F. Dairying, TU TH. Physics, TH.	Chemistry, TU TH. F. Physics, M. W. Sanitary Engineering, TU, TH F	Railroad Surveying, M W F English Literature—5 4 P M —5.

SENIOR YEAR.

FIRST TERM.

8 A M. -9.	9 10	10 11.	11 12.	2 P. M. - 3.
Psychology--5 Resistance of Materials--5. Thermo-Dynamics- 5 7 A. M.--8.	Anatomy of Domestic Animals—5 Astronomy - 5 Bridge and Roof Structure--5	Stock Feeding and Experimental Agriculture- 5 Structure of Woods, W.	Geology—5. Mechanical Engineering -5	German—5 Landscape Gardening F

SECOND TERM.

Veterinary Medicine and Surgery--5. Mechanical Engineering--5 Roof and Bridge Structures--5.	Physiology TU W TH F. Farm Drainage and Agriculture—5.	Ethics & Civics TU W. TH F. Lectures on Civil Engineering M W F Retaining Walls TU. TH	History of Civilization—5 Disease of Plants. M. W F Injurious Insects, TU. W

Alphabetical List of Text Books and Principal Books of Reference.

AGRICULTURE.—(See Practical Agriculture and Experimental Agriculture.

ALGEBRA.—Loomis.

ANALYTIC GEOMETRY.—Newcomb.

ANALYTICAL MECHANICS.—Church

ANATOMY OF DOMESTIC ANIMALS.—Lectures.

APPLIED BOTANY.—Lectures.

ASTRONOMY.—Olmsted

BOTANY.—Gray, and Lectures.

CALCULUS.—Buckingham.

CHEMISTRY.—*Sophomore Year.*—(*First Term.*)—Richter's Inorganic Chemistry (Science and Agricultural Courses). Shepard's Elements of Chemistry (Veterinary and Engineering Courses). (*Second Term*). Richter's Inorganic Chemistry. Douglass and Prescott's Qualitative Analysis (Science and Agricultural Courses). Tyson's Examination of Urine, Lectures on Toxicology (Veterinary Course).

Junior Year.—(*First Term.*)—Classen's Quantitative Analysis, Douglass and Prescott's Qualitative Analysis (Science and Agricultural Courses). (*Second Term.*)—Remsen's Organic Chemistry (Science and Agricultural Courses).

Senior Year.—(*First Term.*)—Frankland's Agricultural Chemical Analysis (Science and Agricultural Courses). (*Second Term.*)—Prescott's Proximate Organic Analysis (Science Course). REFERENCES—Roscoe & Schorlemmer's Treatise on Chemistry. Watts' Dictionary on Chemistry. Wurtz's Dictionary on Chemistry. Storer's Dictionary on Solubilities. Fresenius' Quantitative Analysis. Sutton's Volumetric Analysis. Wormley on Micro-Poisons. Taylor on Poisons. Works on Technical Chemistry. Vaughn, and others, on Urine Analysis.

CIVICS.—Andrews' Manual of the Constitution. Lectures.

CLIMATOLOGY.—Loomis, and Lectures.

COMMERCIAL LAW.—Parson's Laws of Business, Lectures.

DAIRYING.—Lectures, Arnold.

DESCRIPTIVE GEOMETRY.—Church.

DISEASES OF PLANTS.—Lectures.

DRAWING.—Lectures.

DOMESTIC ECONOMY.—Lectures.

ELOCUTION.—Monroe's Sixth Reader.

ENGLISH LITERATURE.—Green's Short History of the English People. Various Annotated Editions of Chaucer, Shakespeare, etc. It is better that all should not have the same editions, but be able to compare the views of different editors

ENTOMOLOGY.—Lectures.

ETHICS.—Hickok's Moral Science.—Seelye. Lectures.

EXPERIMENTAL AGRICULTURE.—Lectures.

FARM DRAINAGE.—Lectures.

FRENCH.—Various Authors read.

GEOLOGY. Le Conte.

GERMAN.—Various Authors read.

GEOMETRY.—Loomis.

HISTORY.—Creighton's History of Rome and England Green's Short History of the English People.

HISTORY OF CIVILIZATION.—Lectures. REFERENCES—Tyler's Primitive Culture. Tyler's Early History of Mankind. Lubbock's Origin of Civilization. Spencer's Principles of Sociology. Progress in Great Britain. Buckle's History of Civilization. Kindred Articles in the Encyclopedias.

HORTICULTURE.—Lectures. Lindley's Theory and Practice in Horticulture.

INJURIOUS INSECTS Lectures.

LANGUAGE AND COMPOSITION. Lectures. Welch's Grammar. Walker's Analysis of the English Sentence

LATIN. Jones' Lessons. Allen and Greenough's Grammar. Various Editions of Latin Authors.

MECHANICAL DRAWING. Krusi

MILITARY TACTICS Upton's United States Tactics. Hamilton's Elementary Principles connected with the Art of War. Wheeler's Art and Science of War. Lectures.

PHYSIOLOGY Martin's Human Body.

PHYSICS. *Sophomore Year* (*First Term.*) Lectures. Deschanel's Mechanics. (*Second Term.*) Deschanel on Heat.

Junior Year. (*First Term.*) Electricity and Magnetism. Optics and Acoustics. Deschanel. Laboratory Guides: Stewart & Gee, Glazebrook & Shaw, Kohlrausch.

POLITICAL ECONOMY.—F. A. Walker, Mill, Gregory, Wayland, Chapin, Perry, Newcomb, Roschre.

PRACTICAL AGRICULTURE.—Lectures. Emerson and Flint's Manual, and Storer's Agriculture

PRINCIPLES OF MECHANICS.—Lectures.

PSYCHOLOGY.—Lectures. REFERENCES—Hamilton's Lectures on Metaphysics. Cousin's Modern Philosophy. Wayland's Intellectual Philosophy. Morell's History of Modern Philosophy. Mind, (A Quarterly Review). Stewart's Philosophical Works. Lotze's Microcosmos.

RAILROAD SURVEYING.—Searles.

RESISTANCE OF MATERIALS.—Lectures.

RETAINING WALLS.—Tate, Jacob. Allen.

RHETORIC.—Lectures. Hill.

ROOF AND BRIDGE STRUCTURES.—Shreve, Waddell.

SANITARY ENGINEERING.—Philbrick, Latham.

STEAM ENGINE.—Lectures. Rankine, Smith.

STEREOTOMY.—Church.

STOCK BREEDING AND FEEDING—Lectures, and Miles, Saunders, or Darwin's Plants and Animals Under Domestication.

SURVEYING. Davies.

THERMODYNAMICS. Du Bois.

TRIGONOMETRY.—Wheeler.

IN THE VETERINARY COURE:

ANATOMY. Chauveau, Strangeway, Percivall.
BOTANY.—Bessey, Gray.
CHEMISTRY.—Attfield, Gamgee's Physilogical Chemistry.
CATTLE PRACTICE.—Hill, Steele, Clater, Dobson.
DENTISTRY.—Clark.
EQUINE MEDICINE.—Williams, Greswell, Robertson.
HELMINTHOLOGY.—Cobbold.
HISTOLOGY.—Klein.
MATERIA MEDICA AND THERAPEUTICS—Finlay Dun, Bartholow, Wood, Ringer, Morton.
OBSTETRICS.—Fleming.
PATHOLOGY (General).—Green, Wagner, Shakespeare
PATHOLOGY (Surgical).—Fleming, Billroth.
PHYSIOLOGY.—Foster, Dalton, Landois, Flint.
SANITARY SCIENCE AND POLICE.—Fleming.
SURGERY.—Williams, Fleming, Liautard.

ZOOLOGY.—Orton, Paokard, Brooks, Parker, Huxley.

Remarks on the Course in Sciences Related to the Industries.

In the Freshmen and Sophomore years this course is clearly defined, and but few elective studies are offered.

In the Junior and Senior years, however, the student is permitted to select for each term a number of studies aggregating not less than fifteen nor more than eighteen exercises per week. No study, however, can be selected unless the studies *necessarily antecedent to it* have been passed. Selections must be made before the expiration of the second day of the term, and once made cannot be changed.

Any member of the Junior or Senior class who is a candidate for the degree of B. Sc., and who desires to pursue work in any general branch of study to a greater extent than is outlined in the general course, can do so if his written application for the same receives the endorsement of the professor in charge of the given study or department, and of the President, and provided it will not cause any conflict in the hours of recitation. The amout of time given to such study as decided by the professor in charge will be counted as a part of the whole amount of work required. In selecting such additional work the other studies making up the required number of exercises shall embrace the subjects most clearly related to it, and this special study allowed shall not exceed one-third of the term's work.

Mathematics. (PROFESSORS STANTON AND MOUNT.)

[For Text Books used see pages 42 to 45.]

ALGEBRA.—In algebra there are two divisions. The first of these is composed of students who show by their entrance examinations thoroughness in arithmetic and a ready familiarity with the principles of algebra through equations of the first degree; the second includes all students who obtain a high standing in

arithmetic, and pass the required examination in algebra, but who show in this latter study a want of thoroughness. Particular attention is given in this study to the explanation of the cardinal principles, and the drill in the solution of problems and questions is conducted with reference to fixing these principles in the mind of the student.

GEOMETRY.--All students who complete algebra and secure a standing of three (four being perfect) in either of the divisions in algebra are permitted to enter the class in geometry. This class is divided into two divisions, corresponding with those in algebra. The student is early taught the full meaning of a geometrical demonstration. He is warned against learning any proposition by rote; and in order that he may not fall into this error, he is, at the end of the first book, assigned original theorems, which he is required to demonstrate. He is expected not only to understand thoroughly each proposition, but to be able so to arrange and present the points of proof as to form a complete and perfect demonstration.

TRIGONOMETRY.--Instruction is given in this branch during the first nine weeks of the Sophomore year. The class is thoroughly drilled in the nature and use of trigonometrical functions.

SURVEYING occupies the last part of the Sophomore year. Thorough drill is given in the use of surveyor's instruments, and in the measurement of lines and angles and the computation of areas.

ANALYTICAL GEOMETRY.- This study is pursued by the Sophomore class during the second term. The course of instruction embraces determinate and indeterminate geometry, including a full examination of the conic sections. The underlying principles are brought prominently forward and discussed. The student is required carefully to analyze each article. and solve the problem connected therewith. To secure thoroughness frequent reviews are given.

CALCULUS.—Instruction in calculus is given during the spring term of the Junior year. To enter this class it is necessary that the student should have passed the lower mathematical studies of the course. In no case can this study be pursued successfully without previous drill in analytical geometry. The abstruce principles of this method of mathematical investigation

are explained upon the theory of *rates*, rather than upon the theory of *infinitesimals*. Instruction is given by daily recitations and lectures, with a review of the week's work each Friday. Twelve weeks are devoted to differential, and the remainder of the term to integral calculus.

☞ See remarks in black-faced type, page 26.

Physics. (PROFESSOR HAINER.)

[For text-books used see pages 42 to 45.]

The study of Physics begins with the Sophomore year and extends through the Junior year. The following is an outline of the course of study: In the first term of the Sophomore year the main topics are: Composition and resolution of force; the elementary machines; laws of motion; composition and resolution of motion; friction; work; kinetic and potential energy; center of gravity; specific gravity; elasticity; hydrostatics and pneumatics.

In the second term of the Sophomore year: Thermometry; principles of the measurement of heat; specific and latent heat; transference of heat; sources of heat; hygrometry; the relations of gasses and vapors to heat; their behavior when affected by heat; conductivity of heat; the mutual relations of heat and work, serving as an introduction to thermo-dynamics.

In the first term, Junior year, the main topics studied are: Elementary laws of magnetism; the properties of the magnetic field; the potential; principles of magnetic measurements; sources of electricity; galvanic batteries; Ohm's law and its application to simple and divided currents; chemical and heating effects of currents; relation between electricity and magnetism; induced currents; principles and instruments of electrical measurements.

The second term, Junior year, of the Course in Science, is given to the study of light and sound. The main topics are: The nature and the propagation of sound; laws of the vibration of sounding bodies; reflection and refraction of light; photometry; properties of mirrors and lenses; optical instruments; radiant heat; polarization and the physical nature of light.

This embraces the course of study in general physics. The subject is taught by lectures, text-books, and recitations. Experimental demonstrations are given of the important laws and

principles; and, so far as the knowledge of the student will permit, the practical applications of the physical laws in the industries will be indicated.

In the second term of the Junior year the study is pursued by practical work in the Physical Laboratory. One afternoon is given to this work per week.

To students who desire it, and who are properly qualified, an opportunity is given to take extra work in physics. The following is an outline of the work offered: In the first term of the Senior year, a course of lectures in analytical mechanics especially adapted to further the study of advanced physics; methods of physical investigations and the reduction of observations, including the method of least squares. Laboratory work two afternoons per week is required.

In the second term, Junior year, the students in the Engineering courses take special work in electricity and magnetism, instead of the course in light and sound outlined above. A part of the term, however, will be given to those topics in light and sound which are of special importance to the engineer.

Thompson's dynamo-electric machinery will form the basis of instruction. Two exercises per week in the Laboratory are required. The new apparatus recently purchased for the department is specially adapted for this grade of work.

In the second term of the Senior year, the student continues the Laboratory work of the Junior year. Two exercises per week are required. Special topics of practical and scientific value will be investigated; and to assist the student a well-selected *electrical library* will be at his disposal for reference.

Chemistry. (PROFESSOR BENNETT.)

[For text-books used see pages 42 to 45.]

Instruction in inorganic chemistry begins with the Sophomore year and is required in all the courses. During the first half of the year three recitations and lectures per week are devoted to descriptive and theoretical chemistry. The laboratory practice, six hours per week, is intended to illustrate the principles studied in the class-room, each student being required to perform all the necessary experimentation. In order better to train the student's powers of observation he is required to describe the apparatus used and the phenomena observed and to trace the relation of the results to the principles which underlie them. In

the second half of the year, the same general plan is pursued in the recitations and lectures, with the addition of practice in solving problems, writing reactions, and the study of the principles of qualitative analysis. The laboratory work, six hours per week, is devoted to qualitative analysis, consisting of a study of solubility, the examination of known material, and a separation of unknown mixtures. This term's work is required in the agricultural, and in the course in science.

Quantitative analysis in the first half of the Junior year consists of density, gravimetric and volumetric determinations and separations, using first pure chemicals and afterwards impure substances. The laboratory work occupies nine hours per week. In addition to recitations upon the principles and methods of quantitative analysis, the student makes an elementary study of oxidation and reduction.

The study of organic chemistry in the second half of the Junior year is experimental and theoretical, using Remsen's Organic Chemistry as text-book and laboratory guide. There are three recitations and three hours per week of laboratory practice.

Agricultural chemistry in the first half of the Senior year consists of an elementary study of soils, manures, plants, milk, and kindred substances. The work of the Junior year and the first half of the Senior year is required in the agricultural course and elective in the course in science.

The study of organic chemistry in the second half of the Senior year consists of qualitative and quantitative analysis of organic compounds, comprising a study of known materials and followed by an analysis of unknown organic mixtures. The text-book is Prescott's Proximate Organic Analysis. This is a "four hour" elective in the course in science, open to students who have taken all of their above prescribed and elective work in chemistry, and in the order in which it is here laid down.

The students in the Veterinary course study chemistry for one year. The work is introduced by an elementary study of general chemistry, followed by a short course in quantitative analysis. Urine analysis and toxicology occupy the remainder of the year. Chemical and microscopical examinations are made of urine in both its normal and abnormal conditions. The common organic and inorganic poisons are studied in connection with the examination of foods and tissues in assumed cases of poisoning.

The Laboratory furnishes room for one hundred students working at one time, and is supplied with gas and water at each table. Ample facilities are offered for all the work described.

The work offered in chemistry is sufficiently extended to furnish the student a good foundation for further study and research, either as an original investigator or as a practical chemist. The work is recommended as much for its educational value as for its practical utility. Students in chemistry are charged simply the actual cost of the chemicals and other materials used or destroyed in the prosecution of their work.

Biology. (PROFESSORS HALSTED, OSBORN, FAIRCHILD AND STALKER.)

Botany. (PROFESSOR HALSTED.)

[For list of text-books used see pages 42 to 45.]

The study of botany begins in the second term of the Freshman year. The ground covered is that embraced in Gray's First Lessons In connection with this text-book each student makes drawings and descriptions of roots, stems and leaves collected by himself. This is followed by a thorough study of the flower. The terms used in descriptive botany are dwelt upon, and all members of the class become familiar with the methods of determining the botanical names of plants. Each student is required to do some field work for every lesson, either in bringing specimens to the class-room, or submitting a written report of observations made.

In the first term of the Sophomore year the students study plants systematically and learn to recognize readily the most important natural orders. A herbarium of fifty species of flowering plants, named and neatly mounted, is required of each member of the class. In addition to this work in systematic botany, a course of recitations in advanced structural botany, using Vol. 1 of Gray's Botanical Text-book, is pursued by the class.

The study of vegetable anatomy and physiology is begun in the second term of the Sophomore year. The students work three hours per week in the botanical laboratory, and with the compound microscope examine the minute structure of the roots, stems, leaves, flowers and seeds of various plants. The accompanying class-room exercises consist of recitations upon, and elaborations of, the work pursued in the laboratory. Each stu-

dent continues his systematic field work and adds fifty species of flowering plants to his herbarium of previous terms.

In the second term of the Junior year students in the Agricultural Course study the plants of the farm and garden. Special attention is paid to the origination of varieties through cross-fertilization and other means; the accumulation of new characteristics in plants; adaptation to conditions, and similar practical problems in applied botany.

The Seniors in the Veterinary Course during the first term pursue a course of cryptogamic botany, including a systematic study of the flowering plants injurious to domestic animals. A large part of the work consists of microscopic study of rusts, smuts, moulds, and ergot, from a pathological standpoint. The subject of bacteria receives its merited share of attention.

During the second term of the Senior year the Agricultural students receive instruction in the diseases of cultivated plants and become familiar with the life history of the leading destructive fungi. The best remedies are pointed out and experiments with fungicides are made by the class.

The Seniors in the Engineering Course in their first term study the microscopical structure of various woods.

Students in the Science Course specially interested in botany may continue their studies in that branch through the Junior and Senior years. The facilities for such special work are ample. The laboratory is well equipped with apparatus for the anatomical investigation of plants, and the herbarium, including all groups of plants, furnishes means for excellent advance work in systematic botany. Candidates for the second degree have abundant facilities for the pursuit of special lines of investigation in the various branches of botanical science.

Zoology. (PROFESSOR OSBORN.)

[For text-books used see pages 42 to 45.]

In the second term of the Freshman year students take up the study of general zoology by examining and making drawings of animals common in the locality. This work is supplemented in the class-room by lectures and recitations on the general structure, relations, habits, and distribution of animals.

The first term of the Sophomore year is devoted to the subject of general and economic entomology, embracing lectures and discussions upon insects, with particular attention to injurious and

beneficial species. The students make dissections and drawings of representative species, and a given number are collected and classified.

With the second term of this year the student begins the advanced study of comparative zoology by means of dissections and microscopical study in the laboratory, along with lectures and class exercises. This term is occupied with invertebrate animals.

The first term of the Junior year is devoted to a similar study of the vertebrates.

Brooks' Hand-book of Invertebrate Zoology and Parker's Zootomy are used as aids in the laboratory, while the class work and lectures embrace the ground covered in Packard's Zoology.

The Junior students in the Veterinary Course pursue the study of vertebrate zoology in class-room and laboratory during the first term of the year, and in the second term two exercises per week are devoted to lectures and laboratory work upon the parasites of domestic animals.

The Seniors in the Agricultural Course may devote two exercises per week to the study of insects injurious to the orchard, farm crops, and domestic animals.

The Zoological Laboratory is supplied with twenty-four microscopes (Beck's Economic and Histological Dissecting), a sliding microtome, and other apparatus for microscopical study and gross dissections. A supply of marine animals, properly preserved for laboratory work, is kept on hand, so that a thorough study may be made of certain groups otherwise inaccessible to inland students.

The Zoological Museum includes mounted specimens of a number of mammals; several hundred birds, representing the avian fauna of the State; a large collection of reptiles and batracians in alcohol; a collection of Pacific Coast fishes, donated by the U. S. Fish Commission; a few native fishes, and a small but typical collection of lower invertebrates, with a set of glass models representing delicate marine forms. A set of Ward casts, illustrating the principal fossils, is of service in this study as well as in geology.

The collection of insects embraces a large series of native species, in many instances all stages in the life history of an insect being represented. Special care has been taken to secure the species of economic interest. There are also collections of the

nests and eggs of birds, and of skulls, skeletons, and brains of vertebrates. These collections are constantly receiving additions. The museum rooms, as well as the laboratory, are open to students for the direct study of specimens. Visitors are admitted to the museum every afternoon from one to five o'clock.

Opportunities are allowed for pursuing anvanced or special lines of study in zoology and entomology during the Junior and Senior years, and also during the post graduate course.

Physiology. (PROFESSORS FAIRCHILD AND STALKER.)

[For text-books used see pages 42 to 45.]

In the second term of the Junior year the study of comparative and human anatomy and physiology is taken up in a course of lectures and text-book exercises throughout the term. The general and special facts of biology and the anatomical structures of the various organisms are described with as much minuteness of detail as the time will admit, followed by a resume of the subject, in which the evolution of the different systems of organs is traced from their earliest beginning to their most differentiated forms. The course is introduced by lectures on comparative embryology.

By combining the different biological studies of the general course with certain studies of the Veterinary School, it will be seen that a student can devote two years almost exclusively to biological work. Those who desire to spend only a limited time, and who are not candidates for degrees, may, if properly prepared, select entirely from studies in these branches. The selections possible are as follows: First term: Botany, zoology and entomology. Second term: Histology, botany, physiology and zoology or embryology. Third term: Botany, histology, physiology, and anatomy or paleontology. Fourth term: Zoology, pathology, comparative and human anatomy, and botany.

Geology. (PROFESSOR OSBORN.)

[For text-books used see pages 42 to 45.]

Students of the Senior class pursue this subject during the first term. A portion of the time is taken up with lectures; a review of the geology of Iowa, and a study of typical fossils, while the quarries in the vicinity are visited by the students to examine the strata and secure specimens. In the Geological Museum stu-

dents have access to a good collection of common rocks, minerals and fossils, as well as to the series of Ward casts.

Astronomy (PROFESSOR HAINER.)

[For text books used see pages 42 to 45.]

During the first term of the Senior year five exercises per week are devoted to astronomy. The principal topics studied are astronomical instruments; planetary motions; eclipses, chronology; structure of the solar system; constellations; nebulæ; motions and distances of stars; cosmogony.

PHILOSOPHY.

(THE PRESIDENT AND PROFESSORS WELCH AND STANTON.)

Psychology. (PROFESSOR WELCH.)

[For list of books of reference see pages 42 to 45.]

Psychology, which presents an analysis of the intellectual powers, supplies two distinct wants:

First: Giving to the student an insight into his own mental processes, it enables him *to think* with greater accuracy and clearness on the various subjects that thereafter engage his attention; and since success in all the lines of human activity depends on genuine thinking, psychology is one of the most practical of studies.

Secondly: Especially as taught here, it elucidates fully the fundamental principles and mutual relations of the industrial sciences comprised in the various courses of study. Thus, for example, while botany and zoology arrange the useful plants and animals into classes, psychology discloses to the student the unlying principles of association which render such classification possible. While chemistry analyzes the fertilizers and the products whose growth they hasten, psychology reveals the method of reasoning on which such analyses proceed. Moreover, the incipient unit in each science, the processes of experimentation, discovery, and mathematical research, by which it advances, are all brought to light in the study of psychology.

Finally: It is by the study of psychology that we are enabled to classify the industrial sciences into closely related groups, thus showing that no student can become eminent in any one, without studying the entire group to which it belongs.

It is, then, apparent that the student can scarcely reach the final breadth and depth of science, without gaining from psychology the ultimate principles of reasoning and classification on which it is based.

Psychology occupies the Senior class, in the lecture room, five hours a week, during the first term of the year. It is taught by daily lectures and the students make original investigations in the library, according to a syllabus prepared by the professor. In the course of the term, each member writes five essays on different psychological topics. Psychology is a necessary antecedent to such branches as ethics, logic, and history of civilization.

History of Civilization. (PROFESSOR WELCH.)

[For books of reference see pages 42 to 45.]

The study of those forces which promote civilization occupies five hours a week in the lecture room during the second term of the Senior year. One of the main objects sought in this study is to gain a clear knowledge of the origin and progress, up to the present time, of the practical sciences, arts and industries previously studied and practiced in the different industrial departments of the College. In this way it will be seen that the study of the history of civilization is in full harmony with the industrial courses and that the student can hardly attain the complete mastery of his specialty until he knows its history as one of the civilizing forces.

The attempt is also made to give a clear, yet concise, history of the origin and growth of government, religion, science, language, education, industry and mechanic arts; in short, to scrutinize rapidly the forces, both natural and supernatural, by means of which the primitive savage was, as the centuries passed, metamorphosed into the civilized man.

The daily exercises consist of a lecture of twenty minutes on the methods of investigating each of the subjects mentioned, and the remainder of the hour is occupied in hearing written reports from members of the class appointed to pursue, in the library, special lines of research. In this work each member selects a topic in the history of the civilizing forces, which embraces the matter most nearly related to his future vocation.

By the above method, it is believed, the habit of independent investigation is formed. As to the actual knowledge acquired,

nothing further can be attempted than to lay well the foundation for future acquirements in a branch of learning which every genuine student will subsequently pursue.

Ethics. (PRESIDENT CHAMBERLAIN.)

[For text-books and works of reference see pages 42 to 45.]

The last term of the Senior year is devoted to a study of the groundwork of moral science. This study follows psychology or mental science in the course, because it must rest fundamentally upon it. Hickock's Moral Science, revised by President Seelye, was used as the principal text-book in 1887. The text-book for 1888 has not yet been chosen. The text-book is supplemented by lectures, the main object of the whole being to impress upon the mind of the student the belief that man has a moral nature, that this world is, for man, a moral world, created and ruled by a Moral Being for moral ends. That, in no narrow sense, "honesty is the best policy;" that is, right conduct morally is the wisest settled principle of action. That our spiritual environment favors right conduct. That there is "a Power not ourselves that makes for righteousness," and that it is, in the highest sense, wise to work with, and not against, that Power. And, finally, that the Christian Scriptures, apprehended by our reason, are on the whole our best means of learning what is the mind and will of that Power. Principles are sought; mere questions of casuistry are avoided. The last six weeks of the term is devoted to Civics, or a careful study of our Government and of our duties as citizens of it.

Political Economy—(PROFESSOR STANTON).

[For text-books used see pages 42 to 45.]

In this division of social science are taught, by text-books, familiar lectures and discussions, the laws of labor—its products and their costs; the principles of capital, money, foreign trade, tariff, taxation, and all the influences that quicken or retard exchange. The student thus gains a thorough acquaintance with the scientific data that underlie and regulate industry, and becomes familiar with the principles that should determine all questions of public policy concerning which there is so wide a diversity of opinion.

COMMERCIAL LAW.

It is the aim in this study to present the general principles of law relating to ordinary business transactions. Contracts, agency,

partnership, sale of goods, commercial paper, and real estate, are studied. The changes in the common law, made by the statutes of the State, are set forth by means of lectures. Particular attention is given to the forms of notes, bills, drafts, checks, etc., and by frequent reviews and examinations the student is made familiar with the requisites of the more common business papers.

LITERATURE, LANGUAGE AND HISTORY.

English Composition and Applied Rhetoric—(PROFESSOR WELCH AND MR. KIRKPATRICK)

[For text-books used see pages 42 to 45].

Instruction in English Composition is given during the first half of the Freshman year. The correct expression of thought through written language is taught, and enforced by frequent exercises. A clear knowledge of the grammatical structure of the English sentence is sought. A thorough knowledge of spelling, punctuation and the proper use of capitals is presupposed, but if found to be lacking on the part of any, special extra drill is given, and work required.

In the second half of the Freshman year the time of three recitations each week is devoted to a series of exercises in applied rhetoric, in which the design is to familiarize the mind with those details of composition and expression, which are most in requisition in practical life, and are usually most neglected; going no further in the philosophy of this branch than these practical ends will indicate and permit. The attempt is to teach the pupil to express his thoughts clearly and forcibly by means of written language.

English Literature—(PROFESSOR BARROWS).

Three hours each week during the first term and five hours each week during the second term of the Junior year are devoted to the study of English Literature. The first aim is to teach the class how to read a great author. For this purpose selections from modern authors, especially Webster and Cowper, will be carefully studied, in much the same way in which Greek or Latin authors are read in classical schools. Then the student will be introduced to Chaucer, Shakspeare, Bacon, Milton and other writers. The course will conclude with a critical comparison of a Greek tragedy with a tragedy by Shakspeare.

History—(PROFESSOR BARROWS).

In the Ladies' course History is taught, two exercises each week, through the Sophomore year. In the other courses it has five exercises each week in the first term of the Freshman year. The History of Rome will be studied from the founding of the city to the year 450 A. D, with which date the class will pass to the study of the History of England. Creighton's brief histories are used in recitations, and in addition the "Seminary Method" is employed in the more thorough study of the most important epochs.

Latin—(PROFESSOR BARROWS).

The study of Latin is confined to the Freshman year of the course in Science, and the Freshman and Sophomore years of the course for Ladies. As so few of the patrons of this College are able to secure instruction in Latin at their homes, a beginning class will be formed. Jones' Latin Lessons will be used, in connection with Allen and Greenough's Latin Grammar. The Latin text-books for the next year will be the *History* of Eutropius, the *Lives* of Nepos, Select *Poems* of Ovid and the *Aeneid* of Vergil.

Latin is studied in this College chiefly as a means of learning the principles of language, the etymology of English words, and the principles of English syntax. It is also a valuable aid in learning the nomenclature of the sciences pursued here. The attempt is to teach it in the way best adapted to promote these ends. In the view of Trustees and Faculty, the object of the College, as set forth in the law of Congress making the land grants that form the munificent endowments of this and similar State colleges, does not require that extended study of the Latin language and literature which may be desirable in colleges founded in another way and for a somewhat different purpose. Such knowledge is acquired as shall be valuable in itself for the purposes named, and shall fit the pupil for further study himself should occasion require, and enable him to teach Latin in any ordinary school. The Greek language is not taught.

French—(PROFESSOR STOCKMANN, 1887.)

French begins in the Freshman year and extends for the gentlemen through one year, and for the ladies through two years. The chief result obtained during the first year is the

ability to translate at sight into and from the language taught. The first term is devoted entirely to the rules of pronunciation, grammar, and idiomatic expressions, all of which are taught through the medium of the language studied. The student is expected, from the beginning, to do original work outside of the class-room and by black-board illustrations. This enables him to become self-reliant in spelling and construction, and greatly aids the memory. Every Friday an object-lesson is given which must be reproduced by the pupils either verbally or in writing for the next lesson. Translations of "*Les Princes del 'Art*," with illustrated conversations occupy the second term. The principal work of the first term of the Sophomore year is conversation and composition in the language studied, for which topics are assigned from day to day. Classical French plays, letter writing, and a course of lectures on the principal French authors, completes the course in the second term of the Sophomore year.

German—(PROFESSOR STOCKMANN, 1887.)

German begins in the Junior year, and is optional in the gentlemen's courses, but when once begun can not be exchanged for any other study. The work of the first term is outlined like the first term in French. Translations from the works of Korner and Schiller with illustrated conversations occupy the second term. Etymology, letter writing, and composition, with a course of lectures in conversation on the history of German literature and art, finishes the study. The course is very short, but the different methods of language-teaching are so well combined in the work laid out that an earnest student can obtain good results.

Military Science and Tactics—(PROFESSOR LINCOLN.)

It is not intended to complete the education of the thorough soldier, but to fit young men for filling intelligently positions in the State troops as line officers and company instructors. The constant demand for men thus trained emphasizes the value of a thoroughly organized and well sustained military course. The chief advantages derived are the acquirement of a dignified carriage of the person, a gentlemanly deportment and a self-respecting discipline, with habits of neatness, order and punctuality. Opportunities are afforded each cadet for extending the studies in military science as desired, the College being provided with the necessary arms, accoutrements and outfits for drill and instruction

in the infantry, artillery, and signal tactics, for which special classes will be formed. Lectures on military subjects are delivered throughout the course, and regular battalion drill and dress parade take place each Wednesday and Friday afternoon. All male students of the college, except such as may be excused for good reason by proper authority, are required to become members of the college battalion, and wear the prescribed uniform during military exercises.

Elocution—(MRS. RILEY, 1888.)

Instruction in elocution is given in all the courses. The system of voice culture is based upon the discoveries of modern scientists and removes all impurities from the voice, giving fullness, flexibility and power. A thorough physical training is involved in this course, resulting in improved health as well as grace and ease of manner The laws underlying the art of expression are taught, so that the pupil becomes the master of principles and rules, not a mere imitator of a certain model. The philosophy of expression taught is that discovered by Delsarte in gesture, and that adaptation of the system to voice and rendering begun by Professor Lewis B. Monroe, and developed by Professor C. W. Emerson, of the Monroe Conservatory of Oratory.

Vocal and Instrumental Music, and Painting—(MISS GAFF AND MISS GOWDY, 1887.)

The above branches are not taught by law in the College curriculum. Opportunities are afforded, however, to such as desire it to take lessons upon the organ, the piano, in vocal training and in painting.

THE PIANO FORTE.—In the study of this instrument particular attention is given to technique as a necessary foundation for a perfect mastering of the piano forte. The works used are technical studies of a high character and the compositions of the best writers.

THE PIPE ORGAN.—The methods of George Whiting of the New England Conservatory of Music, are followed as far as possible, and the Works of Kirk, Mendelsshon, Guilmant, Whiting and others are used. No pupils are advised to take up the study of the Pipe Organ until somewhat advanced in piano forte

playing. Charges per term of twenty lessons upon the piano or organ ten dollars. For use of piano two hours' daily practice fifty cents per month. For use of piano one hour daily practice twenty-five cents per month. No pupils are taken for less than a full term, and no deduction will be made for temporary absence from lessons.

VOCAL MUSIC.—Instruction in vocal music is given in private lessons and to a choral class. The choral exercises are most effective in rendering works which train and strengthen the voice, and elevate the musical taste. Charges per term of twenty half hour lessons, ten dollars. Choral class two lessons per week for four months, four dollars.

PAINTING.—Charges per term of twelve lessons ten dollars. Materials can be obtained at the College.

The Library—(MRS. RILEY, LIBRARIAN.)

The library numbers about eight thousand volumes. These have been selected with reference to the wants of the departments, the aim being to build up a working library, which shall furnish the students, who are pursuing investigations beyond the ordinary text-books, with the best authorities and works of reference. It is not the intention of the College to furnish in its library a means of amusement, and while its officers hope to see the students use the books freely, they expect that such use shall be in all cases with a definite object in view. As the student's stay in college is short, and his time consequently of the greatest value, he cannot afford to waste it in the desultory reading even of good books. It is therefore urged upon students that they lay out for themselves courses of reading and study in the library, under the advice of the Librarian, or of some of the professors. It is urged further that students make frequent use of the books of reference recommended by the teachers of the various college studies. The library is open from 10 A. M. to 12 A. M., from 2 P. M. to 5 P. M., and from 7 P. M. to 9:45 P. M.

The Course for Ladies.

This course is much the same as the general course for gentlemen, except that more time is devoted to language and literature and less to pure and applied science. A careful examination of the arrangement of studies, (see tabulated arrangement, pages 40-41), will show that a lady may pursue a language study throughout the course and combine with it any two of the five named sciences. A lady student, for example, may take two years of Latin and two years of German or two and a half years of either Latin or German and a year and a half of French In addition to the other literary studies the lady student takes botany one year and has the choice of any two of the following sciences, viz: mathematics, physics, chemistry, zoology, and vegetable physiology. Opportunities are given, to such as desire it, to take lessons in music and painting, and the very best instruction is provided in both these branches. Students in addition to recitations and lectures upon the various topics in domestic economy receive practical training in all branches of house-work and general household management. They are not required to perform a greater amount of labor than is necessary for the desired instruction. Other courses, especially the Course in Science, are also open to ladies.

The Course in Agriculture.

The course is designed to meet the wants of such pupils as desire an extended course in the sciences which underlie agriculture, with special reference to their practical application in the diversified industries of the farm. Particular attention is paid to the problem of economical production, and to the reduction of farm improvement and management to a science which shall eliminate, as far as practicable, elements of uncertainty, and teach well defined principles of success. The course has been framed to combine that knowledge and skill which will best prepare the pupil for the highest demands of agricultural industry. The distinctive work of the course is divided into the two departments—Agriculture and Horticulture, and during the Freshman and Sophomore years is identical with the course in Sciences Related to the Industries.

Agriculture—(PROFESSOR SMITH AND THE PRESIDENT.)

In the first term, Freshman year, Stock Breeding is taught, two lessons per week. These lessons begin with lectures on the Breeds of Live Stock, their valuable points and fields of usefulness. For the laws of breeding, a text book is used together with such notes as are needed to round up the work according to the recent developments of the times. Lectures are also given on managing and judging stock, which are illustrated by the large variety of grade and thoroughbred stock on the College Farm.

In the second term the Freshman class pursues the study of Horticulture under Professor Budd. The auxiliary or supporting studies of the Freshman and other years may be seen in the schedule of studies for the course in Agriculture, and the general plan in Horticulture may be seen from the remarks on Horticulture that immediately follow these on Agriculture

During their first term the Sophomores study agriculture; first under Professor Smith for about ten weeks. By text-

book and lectures he will aid the class in tracing agriculture as an art to the several sciences on which it fundamentally rests, showing its exact relations to each, and the aid that has been and may still further be derived from each by the educated, practical farmer. Attention will be given during this part of the term to the feeding, care and management of farm live stock; both to the scientific principles that underlie, and to the practical art that is at last, really built thereon.

During the last six or seven weeks of this term President Chamberlain will give a course of from twelve to fifteen lectures on practical agriculture. The course will embrace the following general subjects: The inducements of farming as an occupation for the educated; soils,—their formation, composition, varieties and proper management; tile and other drainage,—principles, effects and methods of doing the work; farm buildings,—principles that determine their form, character and location,—the model barn; farm crops,—kinds, rotations adaptations to soil, climate, market, &c.; tillage,—principles, implements, methods, results; manures, —their elements, uses and methods of saving and applying; commercial fertilizers, composition, manufacture, uses, defects; clover,—its uses as food and as manure, and in rotations of crops; farm machinery,—principles of construction, uses, management, repairs, care and preservation; specialty farming and mixed farming,—advantages of each, principles that govern the choice between the two; general business management of the farm.

Students will be required to take notes, and recite daily on the lecture of the preceding day. Occasional field lectures will familiarize the student with the details of the above topics. It is believed that few institutions have so complete facilities for illustration in Agriculture and the care of stock as are found in the systematic divisions of improved stock, horses cattle, sheep and swine, and the arrangements of fields, buildings and machinery upon the College Farm.

During their second term the Sophomores study Horticulture under Professor Budd. See remarks on that subject below.

Thus far the studies in Agriculture are pursued by all young men in the College except those who have definitely chosen one of the courses in Mechanic Arts or in Veterinary Medicine. The studies are therefore thus far of a more general character, furnishing valuable mental drill and giving information that is valuable in any walk of life.

At the beginning of the Junior year, however, the Agricultural course and the "Course in Sciences Related to the Industries" diverge somewhat. This is to enable those who wish to pursue agriculture or horticulture as a life work to devote more time to special studies in those directions than it is deemed wise to require of those who intend to follow any of the other "several pursuits and professions of life." Special Horticulture is pursued under Professor Budd, while all the studies of the term (see schedule of studies) are such as it seems absolutely necessary for the educated farmer, stockman, nurseryman, horticulturist, landscape gardener or professor of agriculture to pursue. Indeed the same is true of all the subsequent studies of this course.

In the second term of the Junior year instruction in the dairy is given two days per week, during which the following among other topics are discussed in a practical way: Essential points of the dairy cow; the best breeds and crosses; food and management; milk, its constituents, and its value as food; practical dairying and the manufacture of butter and cheese by the most approved methods. To illustrate and demonstrate the various problems there is upon the farm a dairy of seventy cows, composed of pure Shorthorns, Holstein and Jerseys, with their grades. The dairy barn is ample for eighty cows, and has facilities for storing food and making experiments upon a corresponding scale. The creamery is a substantial structure, with a full supply of improved apparatus, which will be put and kept in excellent repair for the class of 1888 and for succeeding classes.

The studies of the Senior year are almost wholly special, as will be seen by examining the schedule; and while they are thoroughly scientific, special care is taken to make them as thoroughly practical by means of constant illustration, experiment and practice, in laboratory, stock yard, barn and field. The excellent Veterinary Department of the College gives rare facilities for the study of the anatomy, physiology, hygiene, diseases, treatment and care of domestic animals; and the agricultural students are given every opportunity to avail themselves of these facilities.

Horticulture and Forestry—(PROFESSOR BUDD.)

These studies form a part of the Course in Agriculture. Singly and alone the time allotted to this technical line of study and practice could accomplish little more than to make the student familiar with some of the leading modes and methods of empiri-

cal gardening, considered mainly as a mere art. Supported, however, by the full course in natural sciences, the routine of horticultural operations rises above the level of unreasoning custom to the rank of applied science. The cultivated plant becomes a thing of life, varied in vitality, habit of growth, and fruitfulness by conditions of soil and air more or less under control.

The studies begin with the second term of the Freshman year. No text books are used in this or the Sophomore year, as in the consideration of the subjects of small-fruit growing, orcharding, lawn-planting, flower-border, and forestry, we have no text book as yet adapted to our prairie soil and climate. Instruction is imparted by lectures, making every possible use of the many instructive object lessons of the grounds, the nurseries, the orchards and the horticultural museum.

The supporting studies in botany, chemistry, entomology, agriculture, etc., fit the class for the intelligent consideration of theoretical horticulture as outlined in "Lindley's Theory of Horticulture," enabling the student to comprehend important principles pertaining to vital force, germination, root and stem growth, leaf formation and functions, climatic adaptation, etc., intimately associated in our State with failure or varied degrees of success in all horticultural operations.

MEANS OF PRACTICAL ILLUSTRATION.

1. The vegetable gardens.
2. The flower borders.
3. The ornamental grounds.
4. The experimental nurseries.
5. The experimental orchards.
6. The small fruit plantations.
7. The forestry plantations.
8. The propagating rooms.
9. The propagating pits under glass.
10. The collection of native and cultivated woods.
11. The collection of injurious and beneficial insects.
12. The set of abnormal and diseased growths.
13. A set of fac-simile fruit casts.
14. The horticulture museum, now accumulating.

LABOR.

To illustrate each branch, and enable the student to become familiar with methods and processes, and acquire some skill, he

is expected to engage in such labor as will best promote a knowledge of the particular study in hand for about five hours each week under the instruction of Professor or foreman. Such labor combined with instruction is, in the course of study, denominated "Field Lectures with Practice" or Farm and Garden Instruction.

The Course in Mechanical Engineering.

The object of the course of study and practice in this department (of which Professor Bassett is Dean, or Professor specially in charge) is to impart a thorough knowledge of the application of mathematics, drawing, and the use of tools to the designing, manufacture and operation of machinery. In addition to the technical instruction given, the course also provides the means of obtaining a liberal education

In the Freshman year the studies pursued are much the same as in the course in Sciences Related to the Industries. Free-hand drawing, however, is given four hours per week and is of a character adapted to engineering work.

In the Sophomore year plane trigonometry, land surveying, physics, chemistry, and descriptive geometry constitute the leading studies. Mechanical drawing is continued through the second term and consists of a progressive series of studies and exercises in shading, shadows and projections.

The time set apart for drawing in the Junior year is almost wholly occupied in making working drawings, showing elevation, plan and sectional views of parts of various machines used or built in the machine shop.

During the second term special attention is given to electricity as applied in electric lighting systems.

The entire time of the student in the Senior year is given to special work in Mechanical Engineering, consisting of thermodynamics principles of mechanism, designing, study of the steam engine, drawing, shop work, and preparation of Thesis. Working drawings of an orignal design for an automatic cut-off steam engine are begun at the commencement of this year, lectures on the steam engine and other prime movers being given as the

class progresses. Instruction for the second term consists of lectures on mechanical engineering subjects, and a series of tests of the steam engines and boiler used in the work-shops and for electric lighting. In addition to the completion of the drawings of the steam engine, begun in the first term, each student is required to make a finished thesis drawing.

The professor in charge will select such drawings as he shall desire from the set made by the students in this course, to become the property of the department; or he may require any student to make one or more drawings especially for the department.

The machine and carpenter shops of the department are equipped with steam power, machinery, benches, and small tools suitable for the practical work of the course.

These shops are conducted on the plan of a manufacturing establishment, the students being employed in the construction of machinery and wood work to be used by the College or sold in the market. Students enter the shop as workmen and are taught to make things that are to be used, rather than those designed to suit a theoretical view of mechanical training

The products of the shops are designed with particular reference to their value as a means of instruction as well as for their money value when completed.

Students are required to work in the shops ten hours per week throughout the course, and are under the instruction of a skilled foreman.

The Course in Civil Engineering.

This Course (of which Professor Mount is Dean, or Professor specially in charge) is similar to that in mechanical engineering, and also, though in a less degree, to the science course, as will be noticed upon examination of the several courses of study.

The Freshman year and the first term of the Sophomore year are devoted mainly to preliminary studies including algebra, geometry, trigonometry, land surveying, drawing, descriptive geometry, and language. In the second term, Sophomore year, the principal studies are analytical geometry, descriptive geometry, railroad surveying, (with field practice) and physics. In connection

with the class work in descriptive geometry a series of drawing problems comprising some twenty plates, is prepared by each student.

In the first term, Junior year, students have calculus and a continuation of descriptive geometry. As in the previous term, the preparation of drawings and practice in the field constitute a leading feature of the work.

In the second term, Junior year, students have analytical mechanics, and the survey and location of a short line of railroad, including the complete mapping of the same.

During the Senior year the study of bridges forms an important feature of the work. A bridge, including working drawings of all details, is designed during the second term by each student. Such other subjects as retaining walls, specifications and contracts, sanitary engineering, etc., are also studied during this year.

In all studies taught, it is the object to give practical as well as theoretical knowledge, and for this purpose a large amount of draughting and field work is required of each student. The department is well supplied with field instruments, drawings, blue prints, models; draughting tables, etc., many of which are the work of its own students.

The Course in Veterinary Science.

(A THREE YEARS COURSE.)

It is the purpose of this course or department (of which Dr. Stalker is Dean, or Professor specially in charge, and Professor Fairchild is a principal special instructor and lecturer), to train students for practice in veterinary medicine. The anatomy of the horse is the special object of study, but important structural differences of other domestic animals are carefully noted. The lectures on anatomy are illustrated by means of plates, models, skeletons and prepared specimens of the organs. A convenient and well-furnished dissecting room affords the students every facility for anatomical work.

ZOOLOGY.—In the second term of the Freshman and first term of the Junior year there are two recitations per week in

zoology dealing mainly with vertebrates. During this time the student spends one afternoon each week in the laboratory in the dissection of typical forms.

ANATOMY is taught during four terms as seen by the schedule of studies for the Veterinary Course.

HISTOLOGY AND PHYSIOLOGY.—This embraces systematic histology, which is taught by lectures throughout the first term of the Freshman year, and practical histology, including the microscopic study of the tissues of the animal body. The various methods of preparing tissues for microscopic examination are taught with the object of familiarizing the eye of the student with the minute anatomy of the tissues of the animal body.

PHYSIOLOGY is taught in the first term of the Junior year by lectures, recitations and demonstrations. Physiology is carried along with microscopical anatomy. Labratory facilities are offered to students who desire to engage in original work.

PATHOLOGY.—Pathological specimens of all kinds are brought before the class for the purpose of familiarizing the student with the appearance of diseased tissues. The relations of pathological histology to the principles of medicine and surgery are carefully studied, and the advances made in the application of the microscope to exact pathology fully considered. The use of the microscope in the study of pathological specimens forms an important part of the laboratory work during the last term of the Senior year

BOTANY.—In the second term of his Freshman year the student acquaints himself with general botany, and gives some attention to the identification of plants. In the spring term of his Junior year the student takes up systematic botany and makes a collection of fifty species named and mounted. He is made familiar with bacteria and the germ theory of disease in the first term of the Senior year.

CHEMISTRY.—The elementary chemistry is the same as that given in the first term of the Sophomore year of the Science Course. In the Senior year the work includes the detection of poison; analysis of urine from healthy and diseased animals, examinations of food, and of water; qualitive and quantitative analysis of the secretions in, and excretions from, the body, together with such work as the clinical department may

require. Students also compound or make medicines required by the department. During the second term original work is required.

THERAPEUTICS.—The physiological action and therapeutical value of medicines used in veterinary practice are carefully considered throughout the Senior year.

VETERINARY MEDICINE AND SURGERY.—These subjects embrace theoretical and practical instruction in the treatment of diseases to which all domestic animals are subject, as well as the theory and practice of surgery. Members of the Senior class are made familiar with the uses of instruments and the administration of medicines

CLINICS.—One hour each day is devoted to clinics. The Seniors are required to examine animals for certificates of soundness, diagnose diseases and prescribe for the same.

This Department is really a College of Veterinary Medicine and Surgery, and has the fullest equipments for thorough instruction and practice. The course of study leads to the degree of Doctor of Veterinary Medicine, (D. V. M.)

A THREE YEARS COURSE.—It will be noticed that beginning with 1888 the Veterinary course is made a three years course. This is chiefly to make the course technically more complete, but partly to give time for special drill in general science, and in the use of the English language for those who from early disadvantages may be deficient therein.

The Course in Domestic Economy.

Owing to changes in this Department the special post graduate course has been temporarily suspended. It will be re-established, however, as soon as the new Ladies' and Domestic Economy Hall is completed, or as special demand shall require. Meantime regular instruction in domestic economy and hygiene will be given to the ladies in the college classes by Mrs. Eliza Owens, the newly appointed Professor of domestic economy; to whom the most cordial aid and every facility for efficient work will be extended by Trus-

tees and Faculty. It is the earnest desire of both these bodies including the new Professor to build up this most useful and popular Department The Department or course is based upon the belief that no industry is more important to human happiness than that which helps to make home, and that a pleasant home is an essential element of broad culture, and one of the surest safeguards of morality and virtue. It was organized to meet the wants of pupils who desire a knowledge of the principles that underlie domestic economy, and the studies are specially arranged to furnish women instruction in applied housekeeping and in the arts and sciences relating thereto; to incite them to a faithful performance of the every-day duties of life, and to inspire them with a belief in the nobleness and dignity of a true womanhood.

No calling requires for its perfect mastery more of practice combined with theory, than that of domestic economy, and students in addition to recitations and lectures on the various topics of the course, receive practical training in all branches of housework, in the purchase and care of family supplies, and in general household management.

General and Special Remarks.

SPECIAL LINES OF STUDY.

Any person of mature age and good moral character, who desires to pursue studies in any department of instruction of the college, and who is *not a candidate for a degree*, will, upon application to the President, be admitted on the following conditions: (1.) He must meet the requirements for admission to the Freshman class and pass such special examinations as the Professor in charge of the department selected shall deem essential to a profitable pursuit of the work. (2.) He shall confine his work strictly to the line of study chosen at the time of admission, and shall take enough of class work and of laboratory and other practice to be equivalent to the amount of work required of the regularly classified student. (3.) He shall submit to the same requirements in daily recitations and in examinations, with stu-

dents in the regular courses. Such students will be permitted to room and board in the dormitories of the college if the regularly classified students do not occupy all the rooms.

Students who have successfully pursued thus a special line of study in the Institution, but not such as to entitle them to graduation, will, upon application to the Faculty, be granted the College Certificate showing their standing in such studies.

HIGHER DEGREES.

Such degrees are conferred upon candidates recommended by the Faculty, in conformity with the following rules:

1. The degree of Master of Science (M. Sc.) is open to Bachelors of Science who are graduates of the course in the Sciences Related to the Industries, and before 1881, of the course in the Sciences related to Agriculture, and of the Ladies Course of this College.

2. The degree of Mechanical Engineer (M E.) is open to Bachelors of Mechanical Engineering, and to Bachelors of Science before 1878, who are graduates of the Mechanical Engineering Course of this College.

3. The degree of Civil Engineer (C. E.) is open to Bachelors of Civil Engineering, and to Bachelors of Science before 1878, who are graduates of the Civil Engineering Course of this College.

4. The degree of Master of Philosophy (M. Ph.) is open to graduates of any of the four-year courses of study in this College.

The Faculty will recommend for the above degrees candidates otherwise qualified who, after taking their Bachelor's degree, shall pursue a two years course of study embracing at least two subjects selected with the approval of the Faculty from the list of post-graduate studies, and shall, during that time, reside at the College for at least one year; and shall pass a thorough examination upon that course, showing in one of the subjects special attainments, and shall present a satisfactory thesis.

Each resident graduate must apply in writing for examination at least six weeks before the annual meeting of the Board of Trustees, stating explicitly the subject in which he desires to be examined, and, at the time of examination, (which may be four weeks before the meeting of the Board,) he must present to the Faculty his final thesis.

POST-GRADUATE STUDIES.

Instruction and opportunities for advanced study are given in the following branches to post-graduate students, provided that undergraduate work shall not qualify a student for a post-graduate degree:

1. Psychology. 2. The Philosophy of Science. 3. Social Science. 4. English and American Literature. 5. The Science of Language. 6. Physiological botany. 7. Systematic botany. 8. Zoology and Entomology. 9. Original designs of engineering structures. 10. Veterinary pathology and materia medica. 11. The principles of heredity. 12. Applied mechanics. 13. Agricultultural and organic chemistry. 14. Physics. 15. Analytical geometry and calculus. 16. Horticulture and Forestry. 17. Agriculture. 18. French, German and Latin. 19. History, advanced. 20. Ethics.

EXAMINATIONS, SPECIAL NOTICE.

Examinations for promotion from each college class to the next higher in the course occur only during the last full week of the Fall term and the first week of the Spring term each year. Students who teach school during the winter will be expected so to arrange the time of beginning and of closing their schools as to be present at one of these regular examinations. Students who do not teach will of course be expected to be present. Sickness and actual inability will be held to be the only valid excuses for absence. Special or private examinations cannot be held to suit the convenience of students. To hold them thus would be a damage to all the classes and an injustice to the Faculty. The same general regulations hold good in regard to the examinations at the close of the Spring term in June and at the beginning of the Fall term in July. The success of the College, and of each student in it, depends upon the rigid enforcement of the above regulations.

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